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Where Are Engines For Our Ships?

Ship Launchings Have Run Away from Ship Deliveries and the Gap Must be Closed—A New Problem of Growing Importance

SUCCESSFUL prosecution of modern warfare drains so thoroughly the resources of any nation that it becomes almost impossible to differentiate between the relative importance of a dozen or more industries. The agriculturist can prove to his own satisfaction that the farmer has the most vital war job and no one will attempt to disprove his point that an army without food cannot remain an army. But equal basis remains for regarding the steelmaker, the shipbuilder, the coal miner, the railroad operator, the chemist, the timberman, and dozens of others in essential industries, as vital to military success.

No discussion of the essential character of the work of men in different occupations can fairly ignore the shipbuilder. The lesson of "ships and more ships" has been hammered home so effectively into the minds of all Americans that those engaged in ship work occupy almost a preferred position.

A New Crisis in Our Ship Program

The public conception of what that term means will have to be broadened to meet a critical condition which has been long under development and which is now approaching a crisis. Shipbuilding as such, the act of forming and assembling steel and wood into a shape capable of floating, may have to step from its throne or at least share its royal seat with its twin. The engine builder, the maker of marine equipment, must receive an equal measure of the fostering care which brought the shipbuilder into this present state of power.

From the outside, inspection of the work of the shipping board has revolved naturally around its huge program of shipyard and ship construction. The early dissensions and mistakes focused the public attention on this arm of the government, an attention which remained and grew more impatient of delays as the war spirit gained momentum.

The subsidence of the Hog island criticism, the big "splash" on the Fourth of July, the shipping board's own wisdom in giving wide publicity to its accomplishments in ship and yard building, and the official announcements of our growing mastery of the submarine, have dulled the keen interest formerly taken in the board's program. To the general public, the shipbuilding plans of the government have been carried to a complete success.

The same records, issued by the shipping board, which are beginning to unfold a vigorous story of success in making the United States the world's greatest shipbuilding nation, tell also the story of what is now the biggest obstacle still confronting Mr. Hurley's department. It is the problem of closing the gap between launchings and deliveries.

Deliveries Are Far Behind

Two-thirds of the ships launched for the shipping board since August, 1917, or since the present organization took control, have been completed and placed in service to meet the national needs. One-third have been launched but not completed.

The shipping board has been giving serious consideration to the question of building more engines and of building them at a pace that would match ship launchings. The shipyards have not begun to reach capacity, so that the present margin between ships launched and ships delivered may widen instead of narrow unless a prompt success meets the efforts to promote the manufacture of engines and auxiliary equipment.

An analytical study of this question is presented in the following pages. An interesting and new point brought out is the decision to embark upon a more thorough plan of experimenting with internal combustion engines. The shipping board would do well to take the public more into its confidence on this question of engines. Let the board remove the growing impression that we may find more difficulty on the Kriemhilde line of marine engine building than we did on the Hindenburg line of ship construction.

Engine Shortage Cuts Ship Output

One Million Tons of Ships Launched But Not Fully Equipped —Shipping Board to Experiment With Diesel Engines

(*Official Figures on Engine Program Given on Page* 513)

By V. G. Iden

INASMUCH as the shipping board has been successful in weathering the storm of difficulties encountered in its shipyard and ship construction programs, the lay mind has not grasped the significance of the important obstacle which it is today overcoming. To be able to acquire the requisite supply of engines, boilers and other machinery for the large fleet of merchant ships which are now coming off the ways, the Emergency Fleet corporation is executing an administrative, engineering and mechanical task of no small proportions. Officials of the shipping board and officers of the Emergency Fleet corporation have not shown any great willingness to discuss the marine engine problem, although Chairman Hurley of the shipping board is known to have but recently entertained not the greatest enthusiasm for the situation as it presents itself today.

The difficulties overcome by the Emergency Fleet corporation last winter and spring prompted considerable criticism, justly and unjustly. As Chairman Hurley explained to the senate commerce committee last December, the building program was first delayed by labor difficulties. It was impossible to procure the requisite number of shipyard workers, and strikes among those employed were entirely too frequent. In the second place the transportation problems were tremendous. It was difficult not only to carry the men from their homes to their work, but delay in delivering the materials to the yards was costly. In the third place the design of the wooden ship was changed because some too apparent architectural deficiencies were discovered only after work had begun. As good measure the Emergency Fleet corporation was confronted with a housing problem which was probably greater than that which was discovered in any war industry.

Today's Big Obstacle

These difficulties and obstacles in the way of building a vast merchant fleet to meet the war demands have been of such engrossing importance that the general public has practically overlooked one of the greatest difficulties and the one which the Emergency Fleet corporation is still trying to solve. The problem of manufacturing marine engines, boilers and other necessary equipment for our new merchant fleet will probably not rank second in importance in any of the difficulties which the government has been compelled to confront. The public has been unacquainted with its importance because the government officials have as yet refused to make public the details of the problem over which they are working.

It is generally known that it is intended to equip the so-called standard wooden ships with reciprocating engines, and the larger steel ships with turbine engines. For instance the contract for the Hog island ships requires that all of the vessels launched from this yard shall have turbine engines. The ships launched from the yards of the Submarine Boat Corp. will also have turbine engines. It is also known that early in the spring the shipping board instituted some negotiations with the navy department for the purpose of obtaining some of the turbine engines building for navy vessels. The navy refused to relinquish its prior right and the merchant vessels were compelled to wait.

Deliveries Far Behind

Forced to give way to the navy in its building program, compelled to develop new manufactories for engines and other equipment, the Emergency Fleet corporation has accomplished a no mean task. Up to Sept. 1, 1918, for instance, the corporation had caused to be launched from American yards more than 3,000,000 deadweight tons of merchant ships. At that time a little over 1,000,000 tons had not yet been completed. This is the official record of accomplishment behind which it is impossible to go for the present. To say that practically one-third of the ships built for the Emergency Fleet corporation have not yet been delivered, that is fitted with engines and other machinery, appears upon the face a serious indictment of the work of the corporation. There are, however, extenuating circumstances which are fully appreciated by the initiated.

The record of achievement should be approached from another point of view. On Aug. 3, 1917, the shipping board issued its noted requisitioning order. At the end of the calendar year it was reported by Chairman Hurley that 49 vessels of a total of 300,865 deadweight tons had been completed and put into service. Of more recent date the shipping board reported that the deliveries by American shipyards, and deliveries mean that the vessels have been completely equipped, totaled 327 seagoing ships of 1,952,675 deadweight tons up to Aug. 31, 1918. Between the first of the year and the end of last August, therefore, over five-sixths of the tonnage equipped during that fiscal year were completed. The first million tons of completed ships were obtained during May last. The second million were obtained during August. In other words it required eight months to obtain the engines, boilers, etc., and equip the first million deadweight tons of ships by the Emergency Fleet corporation and only about three months to equip the second million. If this increase is maintained there will be no delay in completing the merchant vessels launched after the present calendar year, despite the fact that the records on this date show that approximately one million deadweight tons of ships already launched are today incompleted because their machinery has not all been installed.

The Pacific coast yards have delivered, completely equipped, more tonnage than the yards in any other district, although the yards on the Great Lakes have delivered completed a greater percentage of all ships launched. The shipping board announced that up to and including the first two weeks of September, the Pacific coast shipyards delivered their first million tons of completed new vessels. The Pacific coast yards lead those of the Atlantic coast by 376,300 deadweight tons and those of the Great Lakes by 611,305 deadweight tons. The Pacific coast yards had, to the middle of September, delivered about one-half of all new tonnage. The board announced the deliveries of completed ships up to and including Sept. 14, from the four principal shipbuilding sections building for the Emergency Fleet corporation as follows:

Pacific coast, 137 vessels of 1,011,160 deadweight tons.
Atlantic coast, 87 vessels of 634,860 deadweight tons.
Great Lakes, 131 vessels of 399,855 deadweight tons.
Gulf coast, 1 vessel of 3500 deadweight tons.

Lake Yards Best in Deliveries

The total tonnage of the vessels built on the Great Lakes may be much smaller than the tonnage completed on either the Atlantic or the Pacific, but the record of accomplishment from the point of view of equipment is probably the greatest. The Great Lakes have equipped a greater percentage of the tonnage built there.

Half of the incomplete new tonnage is on the Pacific coast. The gulf coast yards on the other hand have equipped and delivered but one ship out of the 29 launched. On Sept. 14 more than a half million deadweight tons of new ships were off the ways of the Pacific coast shipyards approaching completion. The vessels launched, but not delivered in the four principal shipbuilding sections on that date, according to the official announcement of the shipping board were as follows:

Pacific coast, 134 vessels of 610,900 deadweight tons.
Atlantic coast, 69 vessels of 392,816 deadweight tons.
Great Lakes, 33 vessels of 117,050 deadweight tons.
Gulf coast, 28 vessels of 102,800 deadweight tons.

On Sept. 14, last, therefore, 356 vessels of 2,045,875 deadweight tons

had not only been launched by American shipyards, but had actually been equipped and delivered to the Emergency Fleet corporation complete in every detail. Taken alone this is a good record. But the story would be incomplete were no mention made of those vessels which were "approaching" completion. There were 264 such vessels, of a total 1,223,566 deadweight tons on Sept. 14. The engines, boilers and other machinery necessary for many of them had, naturally, been built and shipped to the fitting-out docks, but this number of vessels "approaching completion" was large mainly because the Emergency Fleet corporation has not yet been able to develop the engine-building industry of the country to that quantity production that has been accomplished in the shipbuilding industry.

Because the engine-building industry is not yet up to the shipbuilding industry, is one of the reasons assigned for not extending existing plants for the making of ship plates beyond the requirements of the shipways now in operation. No matter what a magnificent record the American shipyards have made to date, that "which might have been" will afford the basis of criticism, even though the criticism is undeserved. It is this tonnage "approaching" completion that must be explained, and that is the tonnage which is today the measure of the engine obstacles confronting the Emergency Fleet corporation.

Wooden Ships Held Up

Of this tonnage "approaching" completion on Sept. 14, 42 vessels of 281,116 deadweight tons were requisitioned steel, 69 vessels of 432,650 tons were contract steel, and 153 vessels of 509,800 tons were contract wood. From this it is shown that the wooden ship is giving the greatest trouble. Of the 42 requisitioned steel vessels launched but not completed, 23 ships of 159,216 tons were on the Atlantic coast, 12 ships of 95,400 tons were on the Pacific coast and 7 ships of 26,500 tons were on the Great Lakes. Of the 69 contract steel vessels "approaching" completion, 20 ships of 142,600 deadweight tons were on the Atlantic coast, 24 ships of 202,000 tons were on the Pacific coast, and 25 ships of 88,050 tons were on the Great Lakes. Of the 153 contract wood vessels not yet completed, 26 ships of 91,000 deadweight tons were on the Atlantic coast, 28 ships of 102,800 tons were on the Gulf coast, 98 ships of 313,500 tons were on the Pacific coast and one ship of 2500 tons was on the Great Lakes.

Undoubtedly the wooden ship program is giving the greatest trouble. Inability to obtain the proper propelling machinery for this particular type of craft can be but the logical excuse for the large number of wooden ships which have been launched but not delivered. This situation brings to the front once more the memorable dispute between William Denman, the first chairman of the shipping board, and General Goethals, the first general manager of the Emergency Fleet corporation, over the relative merits of wooden and of steel ships. Mr. Denman was the father of the idea of building a bridge of wooden ships to reach from America to Europe. Experience has demonstrated the futility of such a plan. It would be impracticable to operate a wooden ship in the Atlantic trade. This is true not because the wooden ship is no good as an ocean carrier, but because of the peculiar emergency situation caused by war. Fuel for ships is so scarce in Europe that a vessel departing from the United States for a European port is compelled to take with her enough fuel not only for the voyage over but also for the voyage back. Should a quantity of coal be loaded into one of these wooden ships sufficient for the going and the return voyage, there would be little space left for cargo.

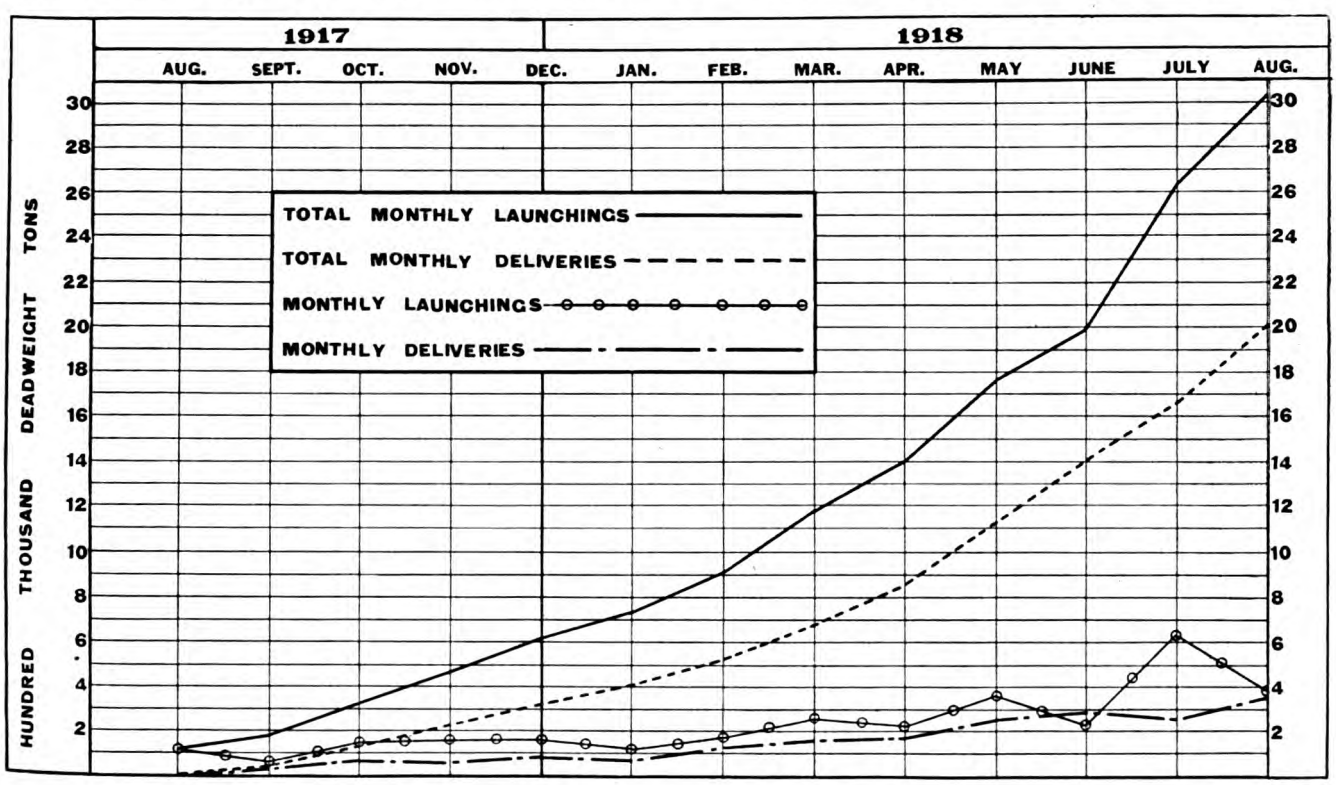
Late Changes in Design

The wooden ship is, therefore, impractical as an Atlantic carrier during the war, but it is expected to place these vessels in service over here. Because the wooden ship is not to be used directly in the war service is not the only answer for the delay in equipping those which have already been launched. This wooden ship has been an experiment ever since the program of construction was inaugurated by Mr. Denman. After work had been started on the vessels, changes were made in their design. So, after contracts had been let for engines and equipment machinery for these vessels, changes were made in these designs. Admiral Bowles of the Emergency Fleet corporation was responsible for the change in the design of the engines and modifications in the boilers.

Explaining these changes in design to the senate commerce committee last December, Admiral Bowles said:

"The plans of the engines and boilers were nearly ready to go to the contractors and the contracts had been placed, and I made from a month's to two months' delay in the completion of these things, because it seemed to me to be absolutely necessary that if we were going to build 400 vessels and 400 engines and some 800 boilers that they should be creditable as an American design in every way, and the changes were made for that purpose.

"The design of the reciprocating engine that was going into those vessels was inferior, and its principal



AMERICA'S 12-MONTH RECORD IN SHIP LAUNCHINGS AND SHIP DELIVERIES.

defect was that it was unbalanced and would cause vibration, particularly detrimental to a wooden vessel. The crankshaft was a continuous crankshaft, and in a wooden vessel the danger of breaking a crankshaft is much greater than in any other vessel, and I thought it ought to be sectional, so that if it did break it could be easily replaced and spares more easily carried in store. There were many other detailed questions in regard to the arrangement of the valves which affected the economy of the engine. The engine we finally adopted is a far more economical engine for steam than the one that was planned. The boiler—the changes were more or less ones of detail for permitting better construction and a less number of individual thicknesses of tubes and plates and one thing and another, and details which added to the safety of the boiler in use."

Admiral Bowles, however, insisted that these changes made in the engines and boilers for the wooden ships would not cause any appreciable delay in the delivery of the completed vessels. The figures nevertheless show that there has been a delay in equipping these vessels to date. The change in design may be fairly accepted as one reason for this delay.

The wooden ship program, despite the serious setback caused by the inability to obtain the requisite engines and equipment, is today showing decided improvement. During August, 22 completed wooden ships of a deadweight tonnage aggregating 78,000 tons were delivered to the Emergency Fleet corporation. Eleven others were virtually completed and ready for delivery but for various reasons were not actually accepted. They were entered on the list of September deliveries. During the last week of August, 16 completed wooden ships, aggregating 57,000 tons were delivered. Two of the vessels included in this total were composite ships.

To the end of August, 184 wooden ships had been launched. On Sept. 14 a total of 153 wooden ships were "approaching completion," launched but not equipped.

Subtracting the wooden ships from the total building program, it would appear that the Emergency Fleet corporation is making good progress with the equipment of vessels. A total of 340,145 deadweight tons of ships were added to the American merchant marine in vessels delivered to the corporation during August last. This was the best showing made for any single month to that date and surpassed England's best month reported to the same date, namely, May, 1918, when 295,911 tons of shipping were produced for the British marine.

Commissioner of Navigation Chamberlain, who numbers and registers all American tonnage just before the ships are ready to take to sea, declared that American shipyards during the 12 months ended Thursday, Sept. 26, established a world's record for ship construction. Mr. Chamberlain estimates tonnage in gross while the shipping board estimates it in deadweight. The return for this 12-month period as compiled by the bureau of navigation totaled 1,956,455 gross tons. And this is completed tonnage, ships with their engines, boilers and other equipment installed. The previous world's record in production, Mr. Chamberlain said, was made by British shipyards in 1913. It was 1,932,153 gross tons. In commemoration of this unprecedented achievement of American shipbuilders Mr. Chamberlain wrote Chairman Hurley of the shipping board:

"In the 12 months ended just now (10:00 a. m., Sept. 26) American shipyards have built and the commerce department, bureau of navigation, has officially numbered 1,956,455 gross tons, passing the previous high record of the United Kingdom for 1913 calendar year, 1,932,153 gross tons launched, of which 1,793,387 gross tons were completed (Lloyds returns).

"The United States for 12 months to date completed 1,956,455 gross tons and the United Kingdom for 11 months ended Aug. 31 completed tonnage 1,512,640 gross tons. Together 3,469,095 gross tons completed exceeds the world's record, 3,332,882 gross tons, launched by all nations in the calendar year 1913."

Although a million deadweight tons of hulls have been launched but not completely equipped because of the shortage of marine engines and other necessary machinery for their fitting out, the record of completion to date is worthy of commendation. The speed with which the second million tons of ships were equipped this past summer gives a reasonable hope that the engine program from now on will improve. As a matter of fact, the officers of the Emergency Fleet corporation contend that the problem is practically solved.

"Under the direction of the Fleet corporation," said Charles Piez, the vice president and general manager of the corporation, "the producing capacity of engines, turbines, boilers, deck machinery, forgings and anchor chains has been considerably increased, and we are now fairly certain that a program of 8,000,000 tons of combined wood and steel can be taken care of in 1919."

As Mr. Piez pointed out, it is vital that the other war requirements of the government be cared for. The navy must have turbine engines for the new destroyers. Materials are required in various war activities which, under other circumstances, might be diverted to the manufacturers producing marine engines.

To obtain marine engines from abroad is practically impossible. On the other hand it has been possible to prevent American engine builders from making engines for foreigners while the demand here is so great. Japan, for instance, formerly purchased engines from the United States. In 1913 the Japanese obtained 48 per cent of their imported engines from Great Britain, 30 per cent from Germany, 8 per cent from Sweden, 6.5 per cent from the United States, and 5 per cent from Switzerland. France and Belgium supplied practically all of the remainder. In 1917, it was reported, 68 per cent of these engines came from the United States, 18 per cent from Sweden, 10 per cent from Great Britain, and 4 per cent from other countries. From this it would appear that the shipping board was slow to realize that many good marine engines of American build were going to Japan. But then the year 1917 was a year of mistakes and experiments, and many of our mistakes were occasioned by the fact that the officials placed in charge of the merchant shipbuilding program were unacquainted with the conditions prevailing.

There is a condition today in the export of marine engines entirely different. "Japanese manufacturers," reported the American consul at Kobe on July 12, 1918, "appear to have developed the production of such engines as are demanded by the consumers, so that at present there does not seem to be a large market for foreign engines." Forced by necessity Japan is no longer calling upon American builders, and American builders can now devote their entire productive capacity to the needs of the Emergency Fleet corporation.

The heroic efforts spent in conserving the capacity of American producers to our own needs, in attempting to locate new plants, etc., have not as yet, however, produced the number of engines required. Some authorities insist that the Emergency Fleet corporation made a mistake in not developing the diesel engine in the first place. William Denman, the first chairman of the shipping board, wished to embark upon this endeavor.

"We did not propose to make diesel ships the exclusive type for the emergency," said Mr. Denman. "All that we hoped for was that during the period of this enormous expenditure, a certain amount of money would be put aside for the development of engine factories, where the diesel motor could be perfected on American soil. We felt, however, that if the war lasted two years, we could obtain a certain number of those vessels, which, with the enormous demand there was for space would be of greater value than other tonnage. That is to say, the cargo-carrying capacity of the diesel vessel is so much higher than that of other ships that, even during the war, we would get some benefit from this type of construction."

Mr. Denman's program did not agree with General Goethal's ideas. General Goethals was swayed by Theodore E. Ferris, the very competent naval architect employed to design ships for the Emergency Fleet corporation. When the diesel engine question was placed before Mr. Ferris for approval he took the position that no American manufacturer had built an internal-combustion engine, put it in a ship, and made an over-sea demonstration of it.

Mr. Ferris recounted the instance of the rejection of the diesel engine idea as follows:

"I remember, when the matter came up, that General Goethals asked me if I was going to pass it. I said, 'Only conditionally; that this man will make guaranty of these engines, and if you are willing to accept the ships under this guaranty and make it conditional, I will pass it.' He said, 'No conditions.' I said, 'Nothing doing; I will not accept any internal-combustion engines for over-sea work,

because they have never been demonstrated.'"

The officials who launched the Emergency Fleet corporation, therefore, abandoned the idea of purchasing diesel engines. This decision was not in accordance with the advice of the shipping board. Not only did Chairman Denman wish to have diesel engines built but so did John A. Donald, a practical steamship man who has been a member of the board ever since its creation.

"The idea is," said Mr. Donald, "that if we get those vessels introduced into the transpacific trade we will have an advantage against the Japanese who, of course, are running with cheap tonnage and cheap wages. Now, if we can run motorships, I think we should develop as much as we possibly can along that line, and I have so written to many of my friends on the Pacific coast telling them I think it is their only salvation."

In the interest of haste and because it was not desired to experiment the Emergency Fleet corporation, therefore abandoned the diesel engine.

Now Testing Diesel Idea

The critics of the Emergency Fleet corporation in this regard may today take some heart. Chairman Hurley acknowledged only recently to the newspaper correspondents to whom he gave audience in Washington that negotiations have been entered into with two American builders to develop a diesel engine for American use.

The lesson in economy in power production and use which America is forced to learn under war conditions is inclining a larger number of people to consider carefully the claims of the more efficient engines. The department of commerce has been interested in the diesel engine from the very first, and the recent negotiations of the Emergency Fleet corporation prove that it has at last subscribed in part to that trend of thought. The bureau of mines of the department of interior has also found sufficient interest in the matter to make a fuel study of the diesel engine.

"The advantages of ships equipped with diesel engines," said the bureau, "lie not merely in the greater cruising radius obtainable with a given quantity of fuel, but in the increased cargo space made available, as the liquid fuel can be stored between the double bottoms of the ships, in dead space otherwise filled with ballast water."

Insomuch as the shipping board has at last taken the initiative and begun seriously to develop the diesel engine for ship propulsion, many authorities will be persuaded to renew their faith in the ability of the Emergency Fleet corporation to put a vast new fleet of merchant ships in service next year. While the first step has been to interest but two American builders, the shipping board will find many other engine builders experienced in the construction of diesel engines and prepared to take up the manufacture of whatever type the shipping board prefers.

The bureau of mines has made a study of the various types of diesel engines built in the United States. From its report on this study the following summary of different designs is taken. The Allis-Chalmers Mfg. Co., Milwaukee, builds a horizontal engine with gas-engine head and eccentric-driven admission and exhaust valves. The horizontal compressor is mounted on the side of the engine frame. It uses the Lietzenmayer system of open fuel nozzle, and variable-stroke plunger fuel pump, which delivers the fuel in the fuel valve during the suction stroke.

The Busch-Sulzer Bros. Diesel Engine Co., St. Louis, was originally the Diesel Motor Co., and later the American Diesel Engine Co., and the first to build diesel engines in America since 1898. It still controls a number of the earlier American diesel patents. It is now associated with Sulzer Bros., of Winterhur, Switzerland. Types of stationary engines placed on the American market by this firm are 4-cylinder units with closed crankcase and 4-stroke cycle, the vertical air compressor having the appearance of a fifth cylinder. The first two stages are obtained by a differential and the last by a superimposed piston.

The Dow Pump & Diesel Engine Co., Alameda, Cal., builds a vertical multicylinder, 4-cycle engine, under license from Williams & Robinson, Rugby, England. It is of A-frame construction and conforms to established European diesel engine practice. The compressor is of the direct-connected, completely inclosed, Reavel type.

The Fulton Iron Works, St. Louis, builds the well known Tosi engine under license from Franco Tosi, of Milan, Italy. The engine is built as vertical multi-cylinder units with 4-stroke and 2-stroke cycle, and with A-frames and vertical 2-stage and 3-stage compressors, depending on the size of the engine. With few modifications, it is built along the lines developed by its European builders.

The Fulton Mfg. Co., Erie, Pa., builds an engine of the marine type, but which can be adapted to stationary work. It is built as a multicylinder engine with 4-stroke cycle and with vertical 2-stage compressor. It is not directly reversible, but uses a mechanical reversing gear.

Designs Its Own Engine

The Lyons Atlas Co., Indianapolis, Ind., developed its own engine, built as 2, 3, 4, and 6-cylinder vertical units with 4-stroke cycle, all with one standard-sized cylinder and 150 horsepower. Admission and exhaust valves are operated through eccentrics, actuating wiper cams, and valve levers. The fuel valve is placed in the side of the cylinder head, and is also driven by an eccentric. This company designed its own fuel pump. The pump consists of a measuring plunger, whose travel is influenced by the governor. It delivers a measured volume of fuel to the forcing plunger while this is on its downward or suction stroke. Combination check and delivery valves control the flow of oil from one plunger to the other and to the fuel valve. There is a separate set of plungers for each fuel valve (per cylinder), housed in one pump chamber. Injection and starting air is furnished by a separately driven Ingersoll-Rand air compressor.

The McIntosh & Seymour Corp., Auburn, N. Y., is the American licensee of the Swedish Diesel Engine Co. (Aktiebolaget Diesels Motorer, Stockholm, Sweden) and owns the American patents and rights of that company. It builds stationary and marine engines with individual A-frames and closed crankcases. They have a 4-stroke cycle, and are equipped with 2-stage compressors. Its newer engines are fitted with 3-stage compressors.

The engine of the National Transit Pump & Machine Co., Oil City, Pa., is horizontal and is fitted with gas-engine head and rocker and wiper type of valve gear driven by eccentrics from the lay shaft. An open fuel nozzle is used, the injection air valve being operated from the lay shaft by means of a cam. The fuel pump and the governor are mounted together on the side of the main frame. It is driven by an eccentric from the lay shaft. The upper part of the plunger is hollow and has seated on its upper end a cut-off valve which is under direct governor control. The plunger has a constant full stroke, the quantity of oil supplied being proportioned to the engine load. The supply is governed by the distance the cut-off valve is held off its seat, its action being that of a by-pass valve. The cylinder liner is removable. A 2-stage air compressor, mounted on the side of the main frame, furnishes the injection air. The engines are built as single and twin cylinder units in size from 50 to 350 horsepower.

The New London Ship & Engine Co., New London, Conn., builds both stationary and marine engines under license from the Maschinenfabrik, Augsburgh, Nurnberg.

Develops 2-Stroke Engine

The Nordberg Mfg. Co., Milwaukee, is the American licensee of Carles Bros., Ghent, Belgium. It builds a single-acting, 2-stroke engine duplicating the well known Carles design.

The engine developed by the Southwark Foundry & Machine Co., Philadelphia, is a single-acting, 2-stroke vertical, multicylinder engine used chiefly for marine purposes; it is then built directly reversible. Differential pistons are used in the engine, the offset being employed to compress the scavenging pump. Air is admitted into the scavenging pump through ports, when these are uncovered by the piston. Only the fuel valves are in the cylinder head. Compressed air for fuel injection for starting and for reversing the engine is furnished by a 3-stage compressor.

The Snow Steam Pump Works, Buffalo, subsidiary of the Worthington Pump & Machinery Corp., New York, builds horizontal, single-acting diesel engines having 2-stroke and 4-stroke cycles. Engines with the 4-stroke cycle have all valves in the head driven from a cam shaft, which is engaged through miter gears by the governor shaft. The pistons are connected with a crosshead carried in a guide. The compressor is horizontal, is carried on the side of the engine frame, and is driven direct from the main shaft. It uses an open fuel nozzel and variable-stroke plunger pump, which delivers the fuel to the fuel valve during the suction stroke.

Priorities Control Marine Trade

Analysis of Government Regulations Which Have Been Devised to Speed Up Production of Ships and Marine Equipment—How They Are Applied

By C. J. Stark
Editor, The Iron Trade Review

PRIORITY regulation of the production of essential supplies, as carried on by the government under war conditions, is the controlling factor in the building of ships and of marine equipment no less than in every other line of manufacturing operations today.

Priority as Judge E. B. Parker describes it is purposeful discrimination. It aims at the prompt satisfaction of all demands for essential material, supplies and equipment within the time required, and in accordance with the importance the use of these essentials shall bear to the prosecution of the war and to the indispensable needs of civil life. The character of the material, equipment or supplies as such does not determine the priority footing given to various demands. It is the purpose or use to which these essentials are to be put that is the governing factor. Priority, therefore, is a rating of purpose, which is based on standards enforced by a war condition. It logically follows that those necessities most closely related to the primary needs of war, are given the higher classification.

Five Classes in Force

All orders or work are divided into five general classes. These are as follows:

AA:—Emergency war work.
A:—Other war work.
B:—Indirect war work and work essential to public welfare.
C:—All other work demanding preference treatment or work placed by or to be utilized in connection with industries or plants included in the preference list covering various lines of production.
D:—All other work.

AA work takes precedence over A work; A work over B work; B work over C work; and C work over D work. This does not mean, however, that all AA work shall be got out ahead of A orders or that A contracts shall be put ahead of those in the B class. The first intent of priority is to insure that delivery dates shall be kept. It A work can be produced to fill its delivery date without interfering with the completion of AA orders within the required time, this may be done. Likewise B orders may be satisfied before AA or A work. Under such circumstances when, however, there is any interference the higher classifications shall have the right of way.

The classes for which formal priority is given are AA, A and B. Each class is subdivided to indicate the relative importance of work falling within that general group.. This is done by the use of a suffix number. Thus AA-1, AA-2, AA-4; A-2, A-5, A-6; B-3, B-4, etc., ratings are made. The force of this is that an order with an AA-1 rating takes precedence over an AA-2 or higher suffix numbers as well as over the lower general classes; an A-3 is given the right of way over A-4 or A-5 as well as over B orders, etc. Formal priority is conferred either by a priority certificate issued by the priorities committee of the priorities section of the war industries board which fixes the rating or by an automatic priority. The automatic priority was created to take care of a number of purposes which it was found from experience and from their character were entitled to a certain priority rating, and to render unnecessary the time and effort involved in applying to Washington for and in getting through a priority certificate. That the automatic classifications have served the intended purpose is shown by the results obtained. When priority ratings were given only by certificates the applications to the priority authorities totalled approximately 2000 daily. This number has been cut down to one-fifth of that number or less. It is provided that where a priority certificate or an automatic priority does not obtain the delivery desired, the rating may be raised to a higher number upon proper cause being shown to the priorities committee.

Owing to the vital relation which shipbuilding and the manufacture of marine equipment bear to the war, these lines of demand for materials, equipment or supplies are given a high position in the field of priority. All contracts placed direct by the Emergency Fleet corporation are automatically classified as A-5 orders and are entitled to all the preference which this rating carries over lower ratings and classes. To obtain the automatic A-5 position on a producer's books, the order must carry an endorsement personally signed by the officer placing the order. It has been decreed by the priorities board that material, equipment or supplies required by the principal contractor for the completion of his order taken from the Emergency Fleet corporation, similarly shall be given an automatic A-5 rating, when a prescribed affidavit is served by the original recipient of the government order upon the manufacturer of these supplies. The latter, however, may not extend this rating to the materials, equipment or supplies which he will need as a subcontractor under the principal order. For these, he must make application for a priority certificate in the regular way.

This procedure upon the part of subcontractors to apply for a priority certificate, it actually works out, is not necessitated as extensively as might appear on the face. This happens because in addition to the automatic A-5 rating which the government gives to all orders placed by the Emergency Fleet corporation and to the needs of the principal contractors it also defines specific classes of work which by reason of their purpose are entitled to high automatic rating on the needed materials, equipment or supplies entering into them. In this list ships and the most important lines of marine equipment are included. For "the building of ships or other water craft for and under direct contracts with the United States Shipping Board Emergency Fleet Corp." an A-5 rating is given. For "the building of all cargo water craft, but not pleasure craft, save such as are under construction by or for the United States Shipping Board Emergency Fleet Corp." an A-6 classification automatically follows. The manufacture of turbines of all classes is given an A-4 footing. The manufacture of locomotive cranes and traveling cranes, takes B-1; the manufacture of electrical equipment other than turbines, but not electrical supplies as distinguished from equipment, receives a B-2 rating. The manufacturer of machine tools for working both metal and wood, all machinists' tools, all small tools and all hand tools receives an A-6 priority on the materials, equipment or supplies necessary to complete his order.

May Extend Original Rating

It has been provided that where the automatic priority ratings are given to orders for material, equipment or supplies for specific purposes or uses the same original rating may be applied all the way down the line by each manufacturer who requires supplies to complete his part in the chain of production. To apply this rule a manufacturer of turbines automatically receives an A-4 rating on the material, supplies and equipment which he requires for the production of such a specific line although the order for the turbines for the Emergency Fleet corporation itself takes an automatic A-5 rating as against other turbine orders. The automatic rating of A-4 is put in force by the manufacturer of turbines serving it upon the sources from which he draws his materials, equipment or supplies and by his certifying with an attached affidavit that these essentials shall be used for the purpose described and for no other. One of these sources of supply may be a foundry which has been furnishing the turbine manufacturer with his castings. The foundryman in turn may use the A-4 rating served upon him for the castings and pass it on to the molding machine manufacturer or

to the crane builder who will supply him; the latter in turn may pass the same priority rating on to his sources of supply. This procedure may run all the way back to pig iron by each manufacturer in rotation furnishing the prescribed affidavit upon the producer who is serving him with material, supplies or equipment. Pig iron is not affected by this rule of so-called "reflected priority." No priorities are issued on pig iron because it is looked upon as the base material or starting point. Because the supply of pig iron is inadequate to meet all demands, an allocating system has been worked out under the pig iron section of the steel division of the war industries board to insure that government and essential needs shall be first satisfied. If a consumer of iron is unable to obtain supplies from his regular source, he applies to the steel director to obtain the metal in his behalf. The steel director through the pig iron section sees to it that a furnace is designated to fill this need. The order then is placed with the specified furnace by the consumer under the authority of the steel director or such government department as may have requested the steel director to arrange for the allocation in behalf of the individual user. The difference between an allocation and a priority is that the former is an order for material while the latter is a rating of the purpose to which these materials are to be put. An order must be placed before priority may be given. Where consumers have iron under contract with the furnaces but are unable to obtain delivery in time to fill the order for their own product taken from the government, the offices of the steel director may be invoked to speed up the shipment of the needed metal. This is what is known as "ordering in" the iron.

Purpose Schedule Is Basis

The basis of the priority system is a schedule of purposes entitled to preference treatment which was announced by the priorities board June 6. This was made public in connection with an agreement with the American Iron and Steel institute which recognized the scarcity of iron and steel for direct and indirect war needs and the necessity both for conserving the supply and of increasing production. In that general purpose list, "ships including destroyers and submarine chasers" were placed as entitled to preference treatment on all necessary raw materials, partially manufactured parts and supplies for the completion of products. The general purpose list is the foundation for class C work since all uses of the character described in this list take a class C standing as to their required material, equipment or supplies unless some higher and superseding rating applies. While the general purpose list was not issued publicly until June 6, it was in fact prepared by the priorities board on March 22. It, therefore, precedes the preference list which, in fact, represents the general purpose list carried out to a more exact basis in that general industries and even individual plants are specified. Preference List No. 1 was adopted April 6. Preference List No. 2, which is much more complete and comprehensive, and supersedes Preference List

P. C. FORM No. 11 No.....
(For use of Committee)

APPLICATION for PRIORITY CERTIFICATE

Date.....

To The PRIORITIES COMMITTEE,
Washington, D. C.

The undersigned hereby requests issuance of a PRIORITY CERTIFICATE for the reasons stated below, and in conformity with the provisions of Priorities Committee Circular No. 3, dated January 1, 1918.

INSTRUCTIONS AND DEFINITIONS.

1. Priorities Committee Circular No. 3 should be carefully read before preparing this application.

2. A separate application blank must be filled out for each case presented; use typewriter when possible; each order on the "person" referred to in paragraph No. 1, below, will be considered as a separate case.

3. The word "persons" as used herein includes any individual, firm, association or corporation.

4. The word "order" includes contract or agreement (singular or plural).

5. The word "applicant" means the person in whose immediate behalf priority is requested, i. e., the first person who is to use the material, etc., covered by this application.

6. The term "original order" refers to the order toward the completion of which the materials, etc., covered by this application are ultimately desired.

7. The term "original contractor" refers to the person who placed the original order.

8. The term "Government" includes the United States Government and the Allied Governments.

9. If applicant is an officer or department of the Government, paragraphs 6, 9, and 10, below, should be disregarded.

10. No application (other than by an officer of the Government) will be considered unless it is first properly sworn to by the applicant.

1—Insert here name and address of person who is to supply the material, etc., or perform the work described in paragraph 5 below. This is the person on which certificate is desired.	Name Address
2—Insert here name and address of applicant.	Name Address
3—State here number and date of order placed with person named in paragraph 1 above, for which priority is desired and date delivery is promised and desired, respectively.	Number of order Date of order Date delivery desired Date delivery promised
4—If order was placed by other than the applicant named in paragraph 2, above, insert here name and address of person who did place the order.	Name Address
5—Insert here particulars of order on which priority is desired, viz: Quantity and description of material; or amount and description of work. Where details are too numerous to list in this space, attach complete list in quadruplicate, typed on paper 8½x11 inches.	
6—List here the numbers, ratings, and subject matters of priority certificates (if any) under which theh applicant is working and for which the material, etc., described in paragraph 5, is needed.	
7—If material or work described in paragraph 5 is ultimately destined to fill one or more Government or original orders, insert name of Government Department or of original contractor and number and date of orders.	
8—State fully why priority is desired and what effort, if any, has ben made to secure delivery without priority assistance. If full statements can not be contained in this space use separate sheet 8½x11 inches. The above must include a statement that no part of the material, etc., for which priority is asked, has been shipped.	
9—(a) Has applicant the plant equipment necessary and now available to execute all orders upon which he is now engaged?	(a)
(b) What per cent of applicant's plant output is now devoted to Government orders?	(b)
10—If applicant has not the plant and equipment adequate to execute all orders upon which he is now engaged, what plant extensions or additional equipment are necessary?	

The undersigned being first duly sworn on oath says that the statements contained in the foregoing application are full, true, and correct; that the quantities are accurately stated and that all articles, material, and work described in paragraph 5 hereof are intended for use in and necessary for the completion of the order(s) concerning which this application is made.

Subscribed and sworn to before me this.....

day of ....., 1918.

.....
(To be signed by applicant)

.....
(Notary Public)

in and for.....

By .....
(Name of officer legally empowered to act for applicant)

No. 1, was issued under date of Sept. 27. The preference list was designed originally by the priorities board to guide the fuel and railroad administrations in serving fuel and transportation to those industries which are considered of an essential character. This list is certified by the priorities board to the fuel and railroad administrations and additions are made to it from time to time to conform with the changing conditions.

The latest preference list, or Preference List No. 2 includes labor supply as well as fuel and transportation supplies. It is announced that this list is for guidance in "(1) for the production and supply of fuel and electrical energy; (2) in the supply of labor; and (3) in the supply of transportation service by rail, water or pipe lines or otherwise insofar as such service contributed to the production of finished products." This list is described by Chairman Baruch of the war industries board as the "master key governing the flow of basic, industrial elements to the industry essential to the war program." The Preference List No. 2 industries and plants have been divided according to their relative importance into classes I, II, III and IV. Industries and plants grouped under class I are those of exceptional importance in war production and their requirements are to be fully satisfied in preference to those of the three remaining classes. There is no distinction or preference between the three remaining classes under usual circumstances. The maintenance and operation of ships, excluding pleasure craft not common carriers, and plants engaged principally in building ships excluding pleasure craft not common carriers and ships not built for the United States government or the allies nor under license from the United States shipping board are put in class I. Steel plate mills and blast furnaces also are in the highest class. Class II includes such industries as machine tool plants and wire rope and rope wire plants. Chain plants are in class III, as are plants manufacturing electrical equipment, plants manufacturing small hand tools for working wood or metal, and plants operating steel rolling and drawing mills exclusive of those taking higher classifications. Foundries and plants manufacturing rope are placed in class IV.

Raise Whaleback From Bottom of Lake

THE wreck of the whaleback steamer HENRY CORT, after remaining on the bottom of Lake Erie for nine months, a constant menace to navigation, has at last been raised and has been towed to Toledo, O., where she is now in drydock awaiting repairs.

The CORT was sunk on Dec. 17 of last year in a collision with the steamer MIDVALE while working as an ice breaker to keep open a passage for late grain vessels. She sank approximately 4½ miles below Bar Point light, 800 feet south of the downward sailing course. When navigation opened this spring the CORT had disappeared and an offer of $500 was made by the Lake Carriers' association for information concerning her location. She was finally located after a lengthy search about 5 miles above Colchester, Ont.

The vessel lay in 30 feet of water, with 7 feet of water over her deck. Her location was marked by spar buoys to warn other vessels. Plans were immediately made to raise her and Capt. W. W. Smith, marine superintendent of the Pittsburgh Steamship Co., owner of the vessel, was sent to the wreck. Early this fall Capt. F. A. Bailey, shore captain of the same fleet, was sent also. Several months were spent in futile effort before the vessel was at last brought to the surface. The work was carried on under great difficulty. The lake is shallow at this point. An ugly sea was running most of the time and often kicked up heavy without warning, on several occasions tearing away the cofferdam which was being built around one of the hatches.

The cofferdam was completed in June and the work of pumping out the vessel begun. As the water in the hold lowered, however, divers who were watching operations closely reported that the vessel's deck was caving in. This necessitated a discontinuance of operations until a new cofferdam could be built.

The successful raising of sunken vessels is an operation always involving difficulties of an unforeseen nature, owing to the fact that methods that have proved successful in one case often turn out utterly valueless under slightly different conditions.

After due consideration of numerous plans used in successfully raising sunken vessels, it was finally decided upon to construct a strong cofferdam running from a position over the collision bulkhead forward to the collision bulkhead aft. The dam was built of heavy timbers and was securely bolted to the vessel's hull by divers who were with the wrecking crew. As a means of keeping the dam as near watertight as possible, canvas held in position by means of sand bags was used.

The barges THOMAS and MAGNA stood by the scene of the wreck and were moored one on each side. They aided materially in breaking the seas that hindered the work of placing the dam in position. The dam in position over the CORT is shown in Fig. 1. The MAGNA is in the foreground, while the THOMAS is seen in the background. The dam in position as it appeared during the middle of September when pumping operations began is seen in Fig. 2. The work of pumping was carried on with difficulty as a heavy sea was running, the full force of which could not be broken entirely by the two barges alongside the wreck. Pumping out the vessel is shown in Fig. 3.

Soon after pumping operations began, a 50-mile gale whipped up and again the case looked hopeless for every sea that struck the cofferdam threatened to demolish it entirely.

On Wednesday, Sept. 18, the steamer HARVEY was hailed and she immediately came to the assistance of the wrecking crew. She was moored in an advantageous position to break the oncoming seas and owing to her length, 420 feet, this maneuver was successful, although the assistance of two tugs was required to keep her in position notwithstanding that she was anchored bow and stern. She is seen in position across the end of the dam in the background of Fig. 2.

The CORT did not rise readily, owing to the fact that her stern had settled considerably in the mud. As the water inside the cofferdam steadily lowered, this structure began to steady itself which in a measure assured success of the undertaking. As the water in the hold lowered, the vessel gradually came to the surface, operations being completed at midnight, Saturday, Sept. 21. The vessel coming to the surface is illustrated in Fig. 4, while Fig. 5 shows her fully afloat and ready to be towed to the drydock for repairs.

She was taken to Bar Point where temporary repairs of a minor nature were completed and on Monday, Sept. 23, she was towed to Toledo by the tugs HARDING, MICHIGAN and TROTTER. The tow arrived at the yards of the Toledo Shipbuilding Co. late in the afternoon.

The examination of the vessel showed that little actual damage had been done. The injury sustained in the collision with the MIDVALE was slight. In fact, if the CORT had not been surrounded with ice at the time, it would have been a comparatively simple matter to beach her as she did not sink until an hour and a half had elapsed after she was struck. Her turrets were carried away by the ice, of course, but the damage inside her hull is slight. Her machinery is not injured in any way, aside from a small amount of rust. She will probably go in commission again next spring.

Late Marine Patents

Copies of any one of the following patents can be obtained by sending 15 cents in stamps to Siggers & Siggers, National Union building, Washington, D. C., by mentioning *The Marine Review*:

1,211,509—Internal combustion engine. Hugo C. Well, New York, assignor of fifty one-hundredths to Frederick A. B. Meinhardt, New York.

1,211,604—Internal combustion engine. Reed M. Lewis, Aliquippa, Pa.

1,211,989—Sunken ship indicator. Henry Westin, Smithville, Minn.

1,212,018—Grate bar for marine and stationary boilers. William C. Codd, Baltimore, Md.

1,212,041—Internal combustion engine. Albert H. Forsythe, Joplin, Mo.

1,212,100—Internal combustion engine. Herschel Oldham, Escondido, Cal., assignor of two-fifths to F. D. Hall, Escondido, Cal.

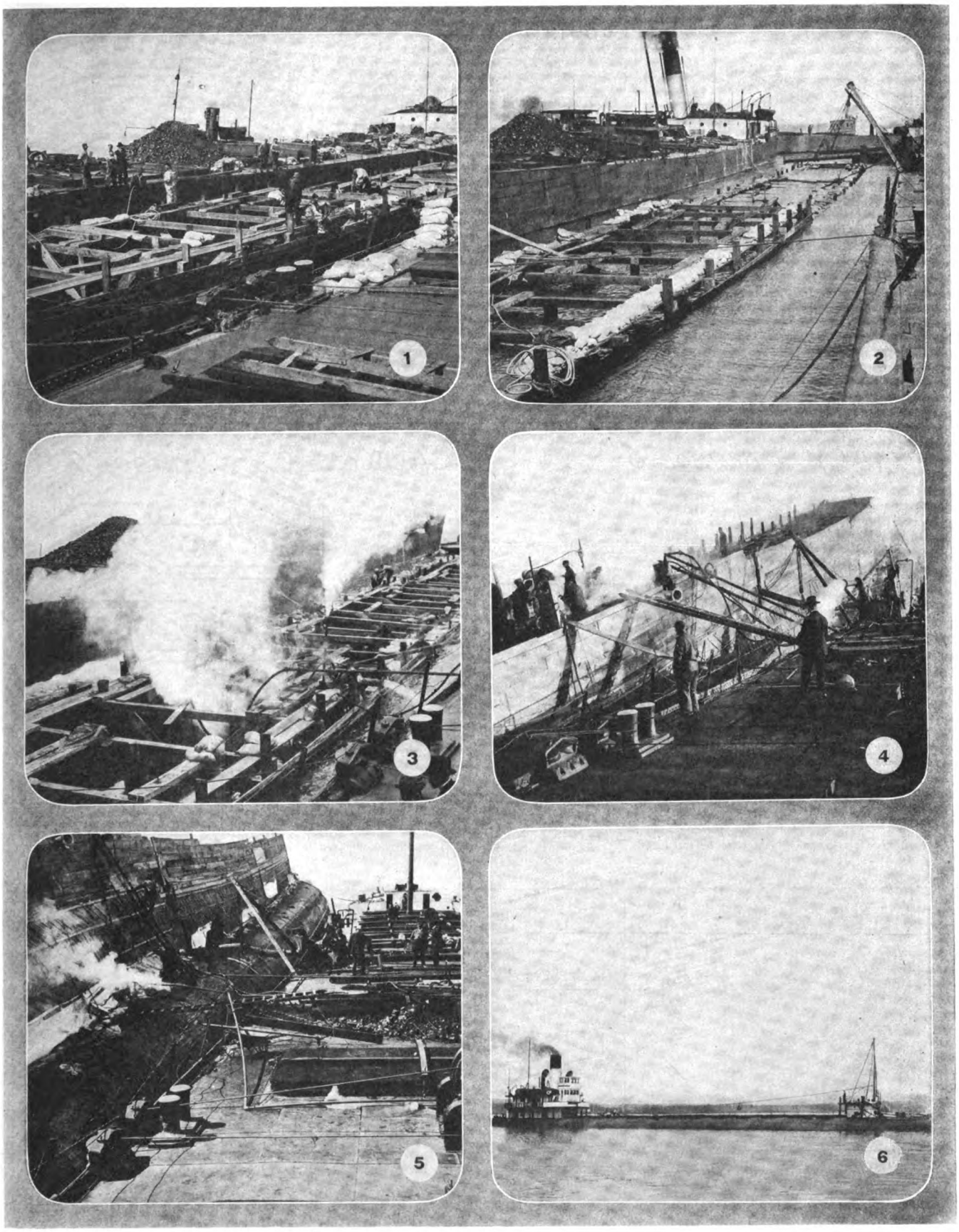
1,212,105—Internal combustion engine. Harvey L. Reese, Sharon Hill, and Haviland H. Platt, Wallingford, Pa., assignors to Reese-Platt, Engine Co., Wilmington, Del.

1,212,315—Life belt. Swan B. Bjerre, Chicago.

1,212,468—Torpedo. Alfred Extrand, Aberdeen, Wash.

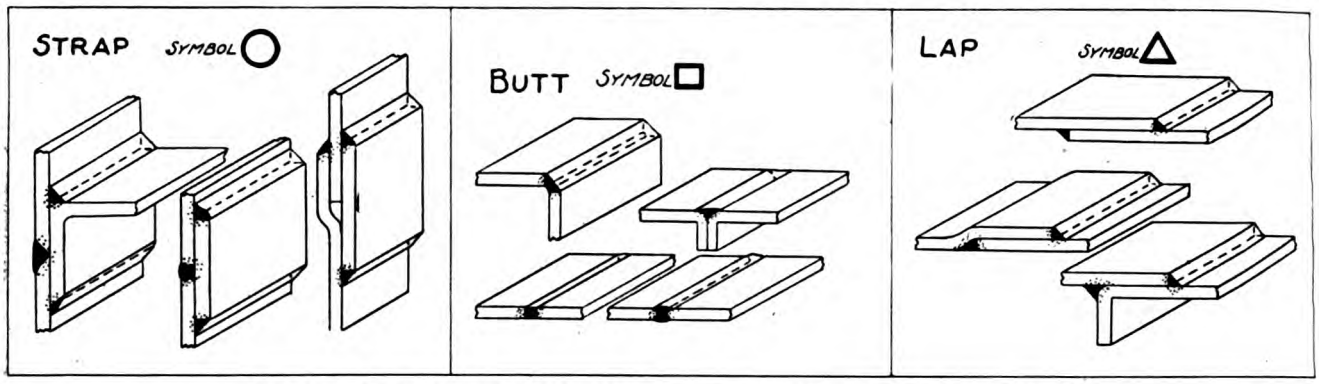
1,212,536—Firing mechanism for automatic submarine mines. Giuseppe Matricardi, Pallanza, Italy, assignor to Societe Harie & Cie., Paris, France.

1,212,653—Internal combustion engine. James Harry Keighly McCollum, Toronto, Ont., assignor to George H. Gooderham, John Wycliffe, Lowes Forester, and the Argylis, Ltd., Alexandria, Scotland.



HOW THE WRECK OF THE HENRY CORT WAS RAISED AFTER LAYING ON THE BOTTOM OF LAKE ERIE FOR NINE MONTHS

FIG. 1—The cofferdam in position over the hull ready for the divers to fasten it in place—The barge in the foreground is the MAGNA, while the THOMAS is seen in the background. Fig. 2—The cofferdam in place on the wreck—Canvas held in place by means of sandbags was used to keep the structure watertight—The steamer HARVEY is seen in the background, where she was moored to break the force of the oncoming seas. Fig. 3—Pumping out the wreck. Fig. 4—The CORT coming to the surface. Fig. 5.—The CORT afloat and ready to be towed to the drydock for repairs. Fig. 6—The vessel as she appeared when in commission in 1917, a typical Great Lakes whaleback.

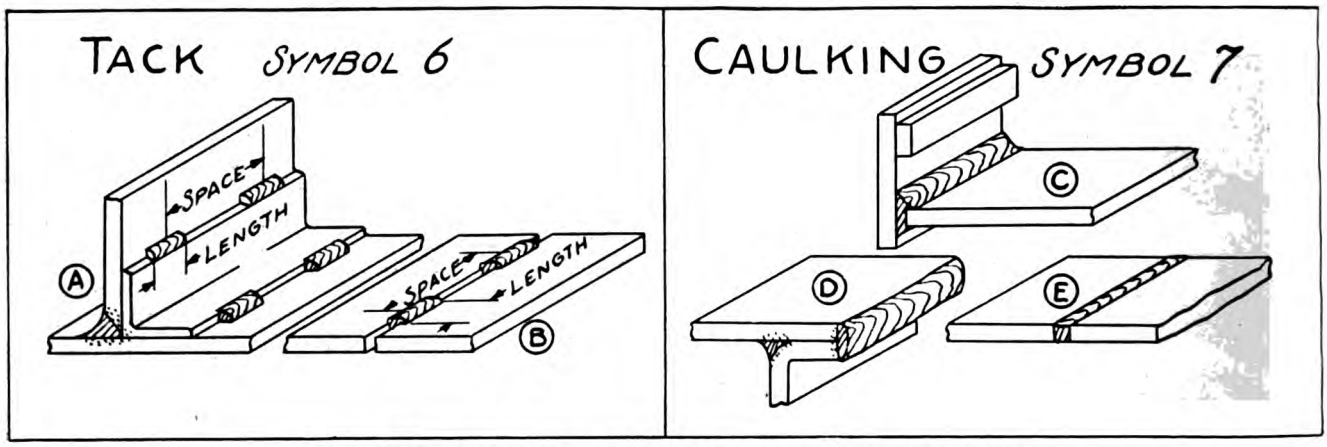


FIGS. 1, 2 AND 3—COMMONLY USED TYPES OF WELDED JOINTS, THE STRAP, BUTT AND LAP

The strap weld is one in which the seam of two adjoining plates or surfaces is reinforced by any form or shape to add strength and stability to the joint or plate. In this form of weld, the seam can only be welded from the side of the work opposite the reinforcement and the reinforcement of whatever shape must be welded from the side of the work to which the reinforcement is applied.

The butt weld is one in which two plates or surfaces are brought together edge to edge and welded along the seam thus formed. The two plates when so welded form a perfectly flat plane in themselves, excluding the possible projective caused by other individual objects, as frames, straps, stiffeners, etc., or the building up of the weld proper.

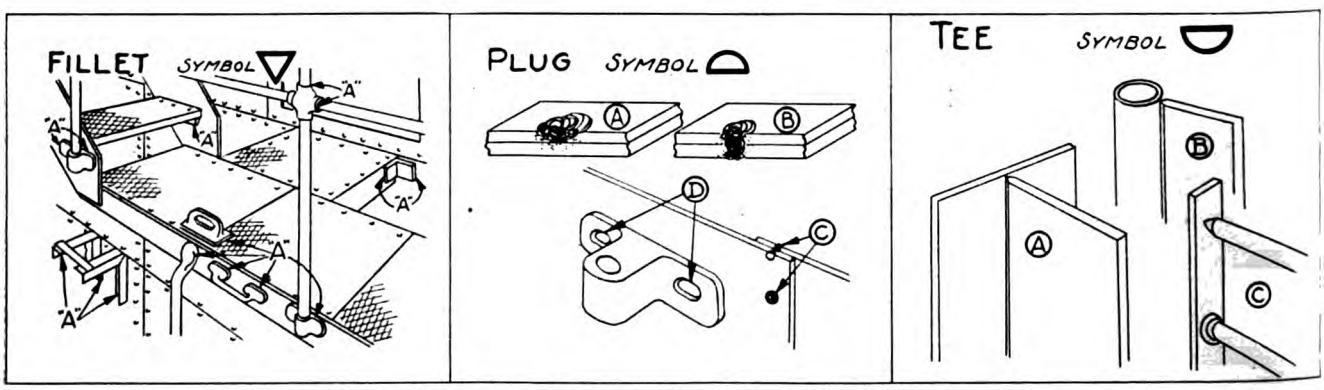
The lap weld is one in which the edges of two plates are set one above the other and the welding material so applied as to bind the edge of one plate to the face of the other plate. In this form of weld, the seam or lap forms a raised surface along its entire extent.



FIGS. 4 AND 5—TWO KINDS OF ELECTRIC WELDS, THE TACK AND CAULKING

A tack weld is made by applying the welding material in small sections to hold two edges together and should always be specified by giving the space from center to center of the weld and the length of the weld itself. No particular design of weld is necessary of consideration. A tack is also used for temporarily holding material in place, that is to be solidly welded, until the proper alignment and position are obtained. In this case neither the length, space nor design of weld is to be specified.

A caulking weld is one in which the density of the crystalline metal used to close up the seam or opening is such that no possible leakage is visible under a water, oil or air pressure test of 25 pounds per square inch. The ultimate strength of a caulking weld is not of material importance; neither is the design of weld of this kind necessary of consideration. The operator must be the judge in the number of layers needed for a tight weld, although the designer should specify a minimum amount of layers.



FIGS. 6, 7 AND 8—OTHER TYPES OF WELDED JOINTS, THE FILLET, PLUG AND TEE

The fillet weld is one in which some fixture or member is welded to the face of a plate by welding along the vertical edge of the fixture or member (see welds A). The welding material is applied in the corner thus formed and finished at an angle of 45 degrees to the plate.

The plug weld is one used to connect the metals by welding through a hole in either one plate as shown at A, or both plates, as at B. This form of weld is also used for filling through a bolt hole as shown at C or for added strength when fastening fixtures to the face of a plate by drilling a countersunk hole through the fixture as shown at D and applying the welding material through this hole thereby fastening the fixture to the plate at this point.

The tee weld is one where one plate is welded vertically to another as in the case of the edge of a transverse bulkhead. This is shown at A, where the edge of the bulkhead is welded to the shellplating. This is a weld which in all cases requires exceptional care and it can only be used where it is possible to work from both sides of the vertical plate. It is also used for welding a rod in a vertical position to a flat surface as the rung of a ladder. This is shown at C. It is also used on a plate welded vertically to a pipe tanchion as in the case of water-closet stalls. This is illustrated at B.

Nomenclature of Electric Welding

The Various Welds Used in Shipwork Are Described and a Simple Chart of Standardized Symbols is Presented

By H. G. Knox, U. S. N.

IT is evident to all persons interested in the nomenclature of welding that, if we are to avoid confusion and retarded progress, we must all talk the same language in discussing the same thing. A typical example of the result where the design followed the actual working conditions is found in the city of Brooklyn, N. Y., where, I understand, Fulton street was laid out along an old cow-path leading up from the ferry. As a consequence of this system of layout, it is confusing to get about that city. The city of Washington, on the contrary, was laid out after considerable scientific study and based on the competitive designs of architects. In this case, the development followed after the design and the result is very much more satisfactory. As a further illustration, you are reminded that the actual working steam engine was in use years before anybody dreamed of thermodynamics, while electricity, following its discovery by Benjamin Franklin, was entirely a laboratory product until the standardization in nomenclature and the theory of the subject had been pretty well worked out. As a result, electricity is a most satisfactory science to work in because all the terms are clear and concise, and I think we owe a great debt to the electrical engineers for their remarkable work in the standardization of their rules.

It is also necessary in welding that at the outset we adopt a uniform terminology. It was early suggested at one of the meetings of the welding committee that we divide all types of welded joints into several main classes, and that a mnemonic symbolism for each be adopted. First, under this classification would come the type of joint, such as the butt, the jog, the lap, the Tee and the strap. The mnemonic symbol proposed was for the butt joint the symbol B, the jog, J, the lap, L, the Tee, T, and for the strap, S.

Next in point of continuity of the complete mnemonic system of symbols are the various types of weld. First, come the foundation or base weld, which is the first run put at the bottom of a heavy V; next, the bolt weld; then the edge weld, the fill weld, the plug weld, the seam weld, the tack weld, and the special types of weld. To illustrate: A joint called a lap filled double tack would, under the mnemonic system, be represented by the symbol L F K K. Since such a notation would be a great deal of bother for the draftsman, we have formed other classifications, and the mnemonic system was abandoned in favor of a more nearly symbolic notation, in which certain symbols, and, in some cases, numbers, have been used with the result that the designations are more easily placed on the drawings.

Fig. 9 shows the instruction chart illustrating the finally adopted symbols. In the first group are the points which should be covered by the general specifications. The second group shows the design, the position of the weld and the type, and this the draftsman must use. There is here a slight similarity in the use of terms that later may be modified for the sake of clearness. Group three will be embodied later in a handbook for the shop, and will cover the material and size of the electrodes, the current and other necessary information for the guidance of the operator. Figs. 1, 2, 3, 6, 7 and 8 represent one of the design subdivisions, namely, the type of joint. These joints are all familiar to shipbuilders. Three characteristic types of the strap joint are shown in Fig. 1; on the left, is an ordinary strap joint in which the joint is backed up by an angle; in the center, an ordinary strap; and on the right, a joggled strap. All strap joints are symbolized by the circle. All the other symbols which go to tell the complete story of the weld are placed inside that circle, as will be explained later. Next is the butt joint, Fig. 2, which is denoted by the square. On the upper right is a type of joint, which, in the original nomenclature, was called a flanged butt. Then comes the lap joint, Fig. 3, which is denoted by the triangle, with the apex up, and under this type is shown the plain lap, the joggled lap and the flanged lap. Of the three other types of joints the first is called a fillet joint, Fig. 6; the second, the plug joint, Fig. 7, and the third, the Tee joint, Fig. 8. The fillet joint is rather

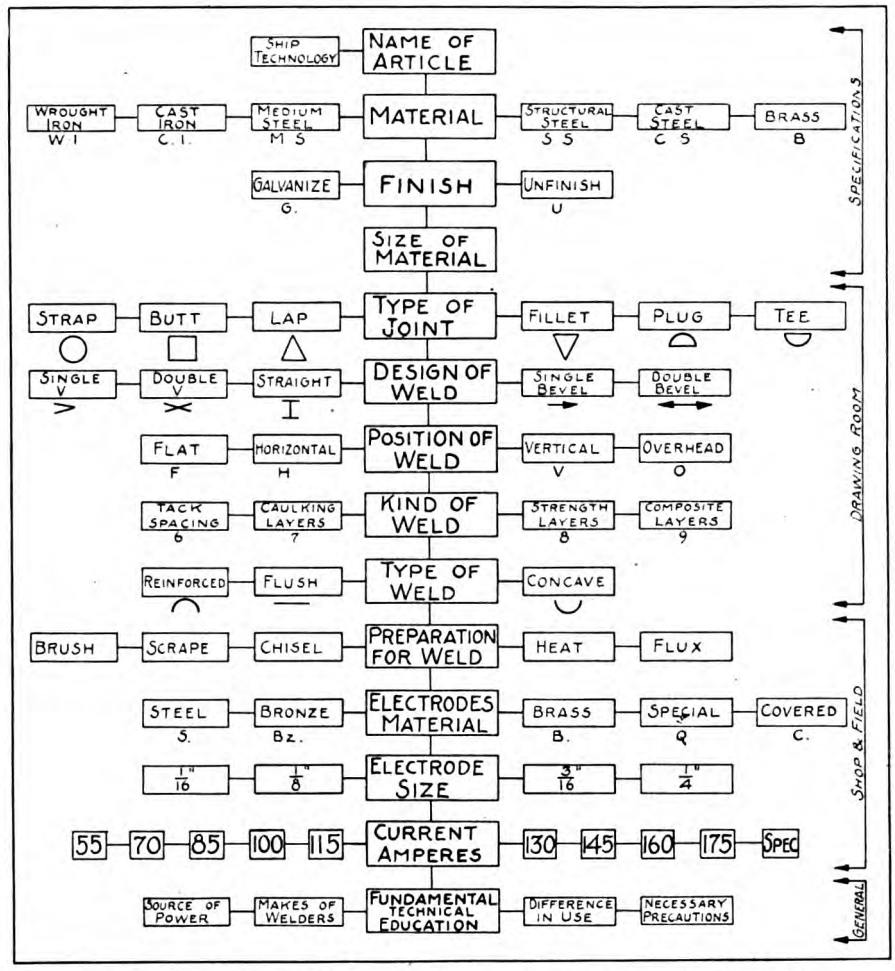
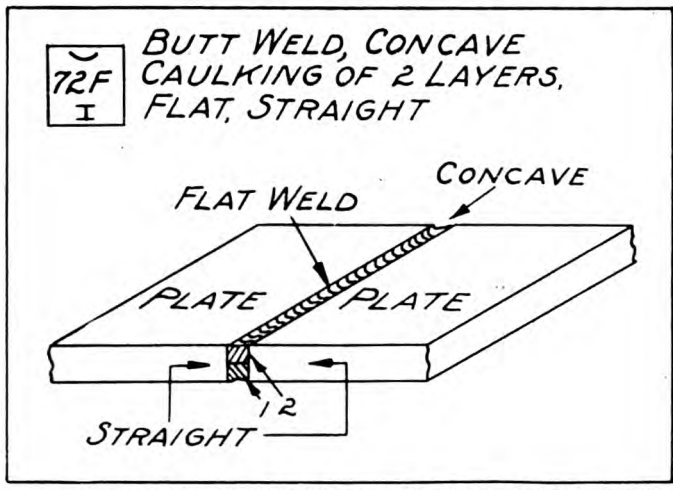
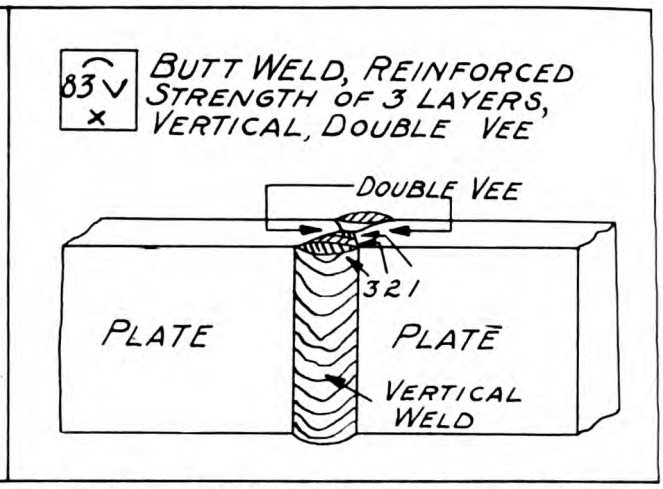


FIG. 9—INSTRUCTION CHART WITH STANDARD SYMBOLS FOR ELECTRIC WELDING

First in a series of lectures on "Electric Welding" held at the Engineers' club of Philadelphia, under the auspices of the United States shipping board. The author is engineer of the power and mining department, General Electric Co., Schenectady, N. Y.





FIGS. 10 AND 11—MARKING FOR BUTT WELD BETWEEN TWO PLATES. AT LEFT IS CONCAVE TYPE WITH TWO LAYERS CAULKED; AT RIGHT IS REINFORCED TYPE WITH VERTICAL DOUBLE-V WELD

The symbol shown represents a butt weld between two plates with the welding material finished concaved and applied in a minimum of two layers to take the place of caulking. The edges of the plates are left in a natural shear-cut finish. This symbol will be quite frequently used for deck plating or in any other place where strength is not essential, but where the material must be water, air or oil tight.

This symbol is used where the edges of two plates are vertically butted together and welded as a strength member. The edges of the adjoining plates are finished with a double V and the minimum of three layers of welding material applied from each side, finished with a convex surface, thereby making the sectional area per square inch of the weld greater than that of the plates. This will be a conventional symbol for shell plating or any other members requiring a maximum tensile strength, where the welding can be done from both sides of the work.

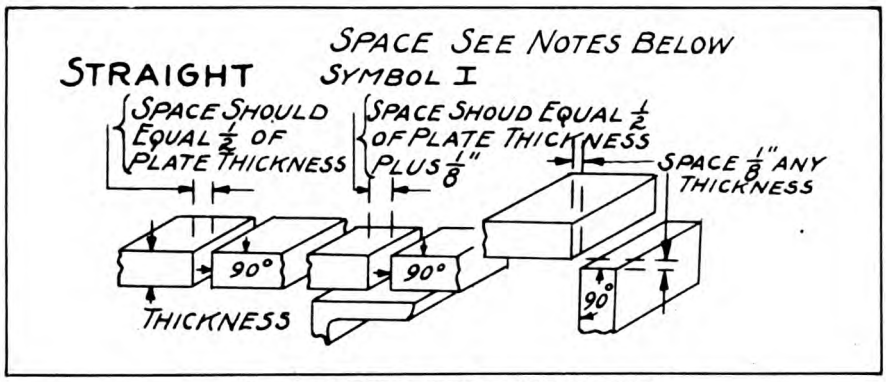
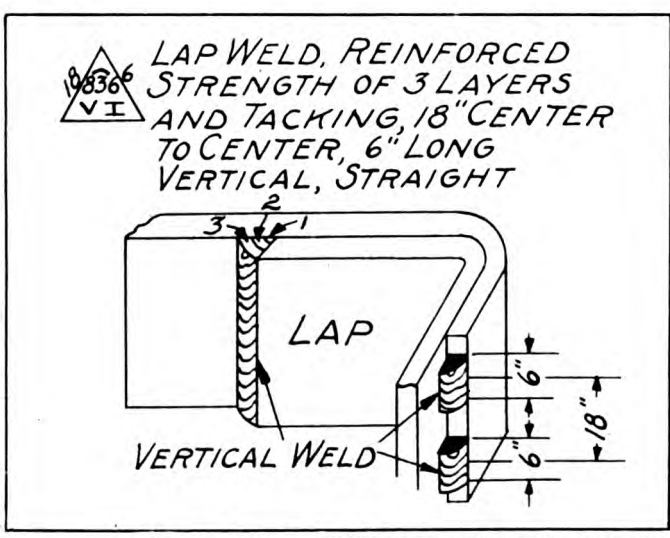


FIG. 12—STRAIGHT DESIGN OF ELECTRIC WELD

Straight weld is a term applied to the edge finish of a plate when this edge is left in its crude or sheared state. This weld is to be used only where maximum strength is not essential, or unless used in connection with a strap, stiffener or frame, or where it is impossible to finish the edge otherwise. It is also to be used for a strength weld when the edges of two plates set vertically to each other, as the edge of a box.

hard to define other than by reference to these sketches, but it is the weld that is made around fittings to plates and its use will be perfectly clear whenever the occasion arises. It is denoted with a triangle with the apex down. The plug joint is the weld used where it is necessary to join one plate to another by means of punching or otherwise making a hole in one plate, such as for service bolts or other forms of preliminary bolting up work, which later requires filling in. It also applies to welds through holes in forgings used in securing the forgings to plates. The symbol in this case is a half circle and straight line, convex side up. The T joint, which is shown in two or three typical forms, is denoted by a half circle with the convex side down.

We now come to the weld itself.



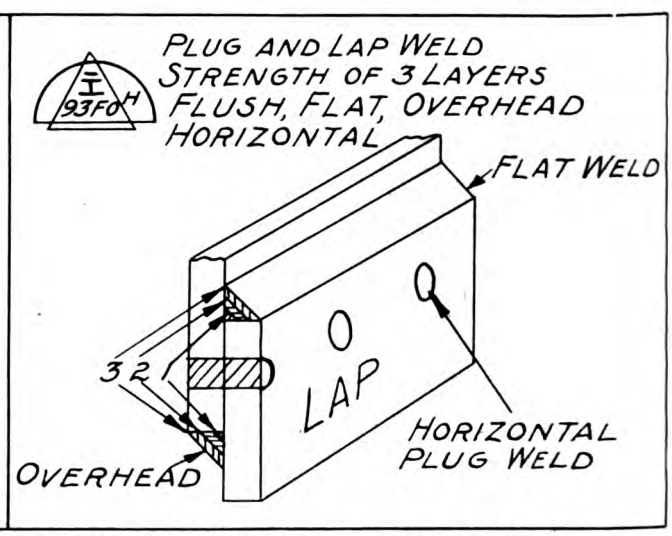
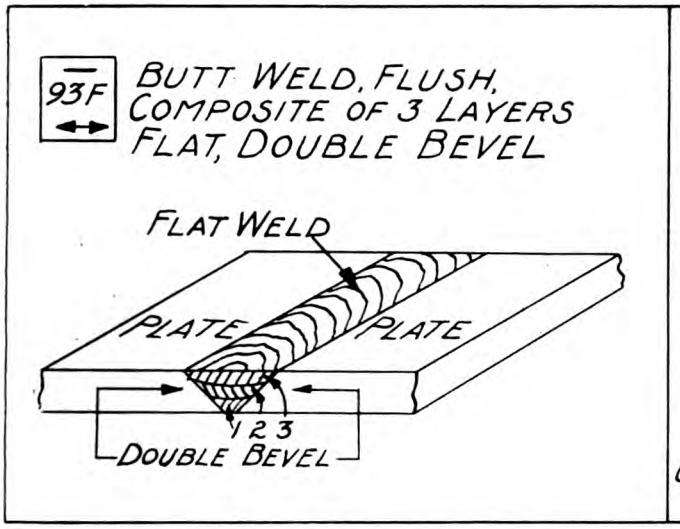


FIG. 13—HOW A REINFORCED STRENGTH VERTICAL LAP WELD AND, FIG. 14, A PLUG LAPWELD ARE MARKED

This illustration is exaggerated as regards the bending of the plates but it is shown this way fully to illustrate the tack and continuous weld. It shows the edges of the plates lapped with one edge welded with a continuous weld of a minimum of three layers with a reinforced finish, thereby giving a maximum tensile strength to the weld, and the other edge of the plate, tack welded. The tacks are 6 inches long with a space of 12 inches between the welds or 18 inches from center to center of welds. In both cases, the edges of plates are left in a natural or sheared state.

This illustration, which is exaggerated, shows a condition which is apt to occur in side plating where the plates were held in position with bolts for the purpose of alignment before being welded. The edges are to be welded with a minimum of three layers of welding material for a strength weld and finished flush. After the bolts are removed, the holes thus left are to be filled in with welding material in the manner prescribed for strength welding. The edges of the plates are to be left in a natural or sheared state, which is customary in most cases of lap welding.



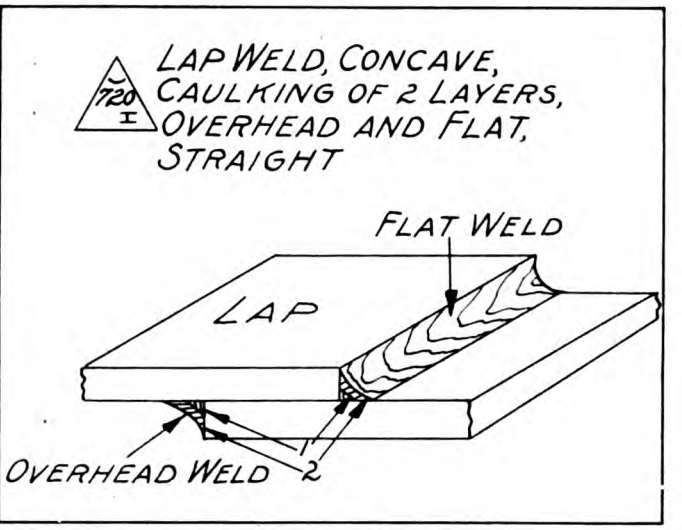


FIG. 15—PROPERLY MARKED FLUSH COMPOSITE BUTT WELD WITH DOUBLE BEVEL. FIG. 16—A LAP WELD WITH CONCLAVE CAULKING

This symbol shows two plates butted together in a flat position where the welding material can only be applied from the top surface. It shows a weld required for plating where both strength and water-tightness are to be considered. The welding material is applied in a minimum of three layers and finished flush with the level of the plates. Both edges of the adjoining plates are beveled to an angle, the degrees of which are left to the discretion and judgment of the designer. This weld should be used only when it is impossible to weld from both sides of the work.

The illustration shows the edges of two plates lapping each other with the welding material applied in not less than two layers at each edge with a concaved caulking finish, so applied as to make the welded seams absolutely water, air and oil tight. The edges of the plates themselves are left in a natural or sheared finish. Conditions of this kind will often occur around bulkhead door frames where maximum strength is not absolutely essential.

The first design, Fig. 17, is the single V, and its symbol is the letter *V* placed on its side. The application of the V is obvious. As a matter of fact, the V joint is very largely confined to heavy plates where they are accessible on both sides and is closely related to the bevel design below. The double V, Fig. 24, is used in joining plates or forgings, and is applied in the case of joints in heavy plates where the plates are accessible from both sides. In extra heavy plates, a successful type of joint may be made by using small triangular filler pieces, thereby reducing the electrode material. The straight weld, Fig. 12, with the symbol of a modified *I*, or *H* placed on its side, is used only for light plates, because the arc is unable to get down between thicker plates and make a good weld at the bottom. If it were attempted to use the arc in a deep, straight-sided opening with a bare electrode, it would jump from side to side and off the body of the electrode

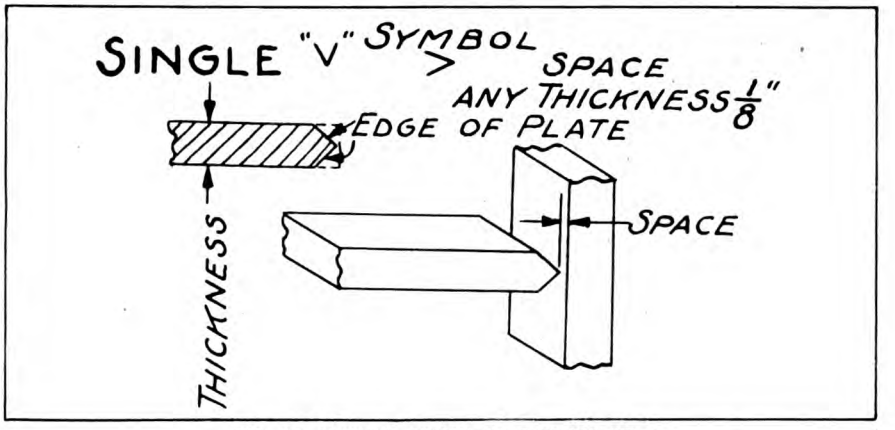
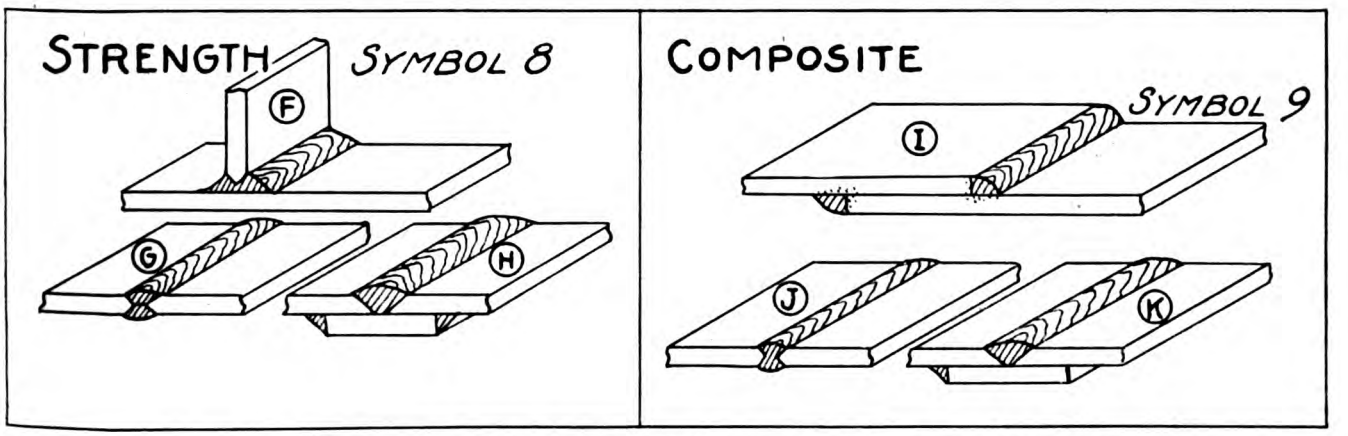


FIG. 17—SINGLE-V DESIGN OF ELECTRIC WELD

The single V weld is a term applied to the edge finish of a plate when this edge is beveled from both sides to an angle, the degrees of which are left to the designer. To be used when the V-side of the plate is to be a maximum strength weld, with the plate setting vertically to the face of an adjoining member, and only when the electrode can be applied from both sides of the work.



FIGS. 18 AND 19—OTHER KINDS OF WELDS USED IN SHIP WORK, THE STRENGTH AND COMPOSITE

A strength weld is one in which the sectional area of the welding material must be so considered that its tensile strength and elongation per square inch must be equal at least to 80 per cent of the ultimate strength per square inch of the surrounding material. This is to be determined and specified by the designer. The welding material can be applied in any number of layers beyond a minimum specified by the designer. The density of the crystalline metals is not of vital importance. In this form of weld, the design of weld must be specified by the designer and followed by the operator.

A composite weld is one in which both strength and density are of vital importance. The strength must be at least as specified for a strength weld and the density must meet the requirements of a caulking weld. The minimum number of layers of welding material must always be specified by the designer, but the welder must be in a position to know if this number must be increased according to his working conditions.

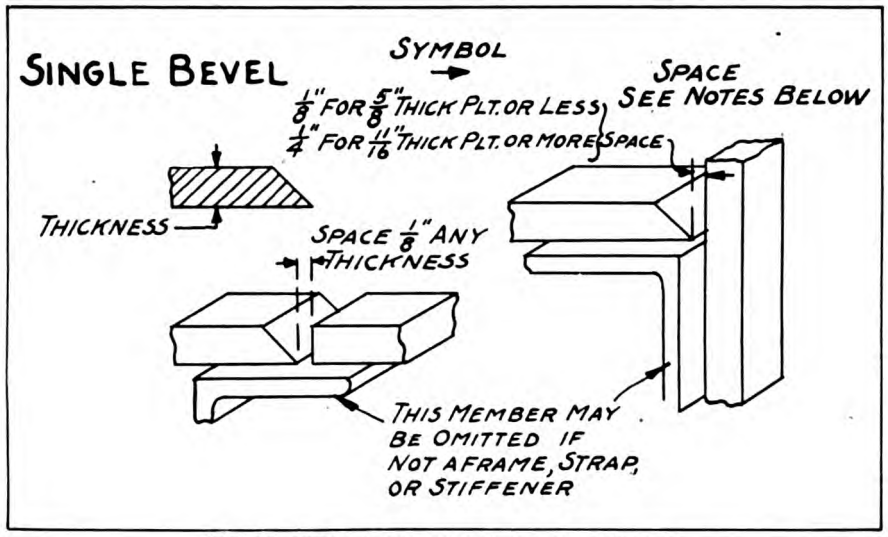


FIG. 20—SINGLE BEVEL DESIGN OF ELECTRIC WELD

The single bevel is a term applied to the edge finish of a plate when this edge is beveled from one side only to an angle, the degrees of which are left to the designer. It is to be used for strength welding when the electrode can be applied from one side of the plate only, or where it is impossible to finish the adjoining welding surface.

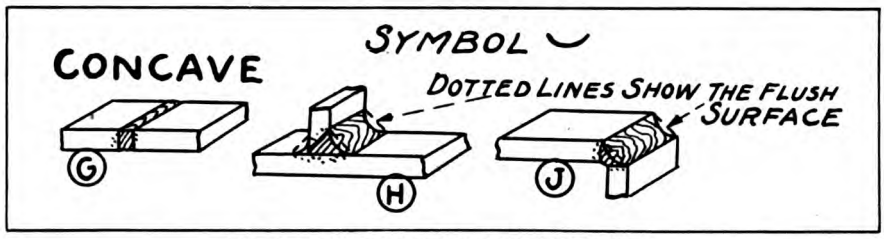


FIG. 21—REINFORCED TYPE OF ELECTRIC WELD

Reinforced is a term applied to a weld when the top layer of the welding material is built up above the plane of the surrounding material, as at A or B, or when used for a corner as in C. The top of final layer should project above a plane of 45 degrees to the adjoining material. This 45-degree line is shown dotted in C. This type is chiefly used as a strength or composite kind of weld for the purpose of obtaining the maximum strength efficiency, and it should be specified by the designer, together with a minimum number of layers of welding material.

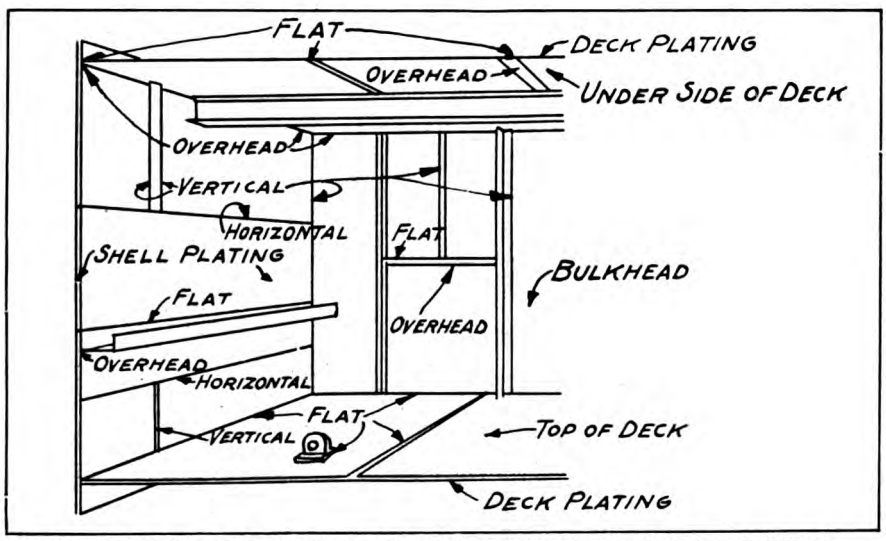


FIG. 22—VARIOUS POSITIONS OF WELDS—FLAT, HORIZONTAL, VERTICAL AND OVERHEAD

Flat position is determined when the welding material is applied to a surface on the same plane as the deck, allowing the electrode to be held in an upright or vertical position. The welding surface may be entirely on a plane with the deck, or one side may be vertical to the deck and welded to an adjoining member that is on a plane with the deck.

Horizontal position is determined when the welding material is applied to a seam or opening, the plane of which is vertical to the deck and the line of weld is parallel with the deck, allowing the electrode to be held in an inboard or outbroad position.

Vertical position is determined when the welding material is applied to a surface or seam whose line extends in a direction from one deck to the deck above, regardless of whether the adjoining members are on a single plane or at an angle to each other. In this position of weld, the electrode would also be held in a partially horizontal position to the work.

Overhead position is determined when the welding material is applied from the under side of any member whose plane is parallel to the deck and necessitates the electrode being held in a downright or inverted position.

rather than off the point. It is necessary, where this joint is used, to vary the space between the edges of the plate, depending upon the thickness of the plate. The single bevel, Fig. 20, is in some ways an unusual joint, not as common as the double bevel, Fig. 23, but it has its uses, particularly in horizontal seams. It is also claimed to be more economical from the machining point of view, because only one plate edge is machined. The double bevel joint is probably the one that will be most employed in ship construction. The symbol for the single and double bevel is the single and double arrow.

Position of Weld

In arc welding the position of the weld makes a great difference. Fig. 22 shows the four different positions, namely, flat, horizontal, vertical and overhead. The flat is the most usual and probably the most favorable position, as though it were being done on a table. The horizontal is such a seam as would be made on a wall along the top of the wainscoting. The vertical, of course, is obvious, as is also the overhead. As to the speed of welding, there is not much difference between the flat and the vertical, and when the welders become skilled there is not much choice, because they can make the two with equal rapidity. When the horizontal weld is considered, it would probably go only 90 per cent as fast as on the flat weld. The quality of the weld is probably about equal. On the overhead weld the speed falls, being only about 60 per cent of that of the flat weld. It is slow because it is difficult to make the arc work uphill, and the strain on the operator is greater. The strength of the welds made in different positions is up to the welder and there can be no rule set. Some experts, however, say that if the flat is 100 per cent, the vertical is 90 per cent, the horizontal 85 per cent and the overhead 80 per cent, but that is based on the margin of safety rather than the actual fact, and the research committee, at least, is not yet to the point of stating that any difference in the quality of the weld is due to its position.

Kind of Weld

The next thing the designer has to tell the welder is the kind of weld to make. The tack weld shown in Fig. 4 is represented by the symbol 6, and is used where neither strength nor tightness is needed. In specifying a tack weld it is necessary to give the length of each tack and the distance from center to center, so that the man on the job may know what the designer contemplated in the way of strength. The next is a caulking weld, symbol 7, in which the prime requisite is not strength, but requisite density to assure water or oil tightness. I have great respect for the man who drew these figures, because on paper there is little difference in them. Symbol 8 is a strength weld, Fig. 18, and, as a matter of fact, a good strength weld will be also usually a good caulking weld. For completion, however, there is specified a composite weld, Fig. 19, which has for its symbol the figure 9. This weld has both qualities of the strength and caulking welds. It embodies the strength of the former, the density of the latter and is thoroughly practicable

The next subdivision is here called the type of weld, but that name may be changed, for the sake of simplifying the terminology. The suggestion, at least, has been made to change it to "finish of weld." The first type of weld is the reinforced weld, as is clearly shown in Fig. 21 in three different types. In the flush type, Fig. 25, the metal is finished straight across, as in the case of a flush rivet. The concave weld, Fig. 26, shows the surface does not need to be filled up full, as in the case of these three illustrations. Being so closely related to strength, the finish of the weld will ultimately have to be specified by the drafting room. Today the designer asks the welder how to best do a job, but of course, ultimately, the design properly symbolized will be shown on the drawing or else will be covered by standard specifications.

Figs. 10, 11, 13, 14, 15 and 16 show the combination of symbols. The square, Fig. 10, is the symbol of the butt joint. The inverted half moon inside the square at the top shows that it is a concave type of weld. Underneath this the first numeral *7* shows that it is a caulking weld, the next numeral *2* behind the *7* shows that the operator must put in two layers. The letter *F* on the same line shows that the position of the weld is flat and the *I* in the bottom of the square indicates that the design of the weld is straight. In the next diagram, Fig. 11, the symbols may be read off in the same way as illustrated. In the third diagram, Fig. 15, the square symbol indicates the butt weld, the dash in the top of the square shows that it is flush, the numeral *9* shows that it is composite, numeral *3* determines the number of layers, the letter *F* makes it a flat weld and, at the bottom, the dash with the arrow heads on each end designates it as a double-bevel design.

Fig. 16 illustrates some additional symbols showing a caulking weld of two layers. It is shown both overhead and flat and the plate finish is straight. The second diagram, Fig. 13, is more complicated, and represents a lap weld, reinforced with three layers after tacking. The distance of the tacking from center to center, the length of the tacks and the finish are all given.

The third diagram, Fig. 14, is another application of the same thing in which two kinds of joints appear, the symbols being superimposed. This indicates that it is a plug and lap joint. Many combinations of symbols have been worked out. These are interesting as is also the ease with which they can be placed on the drawing.

The reinforced concrete cargo steamship FAITH which left a California port some weeks ago for a west coast South American port was,, a few days ago, reported as having arrived safely and in first-class condition. The FAITH discharged her cargo of lumber and reloaded for an Atlantic port.

Under the auspices of the education and training section of the Emergency Fleet corporation, the Massachusetts Institute of Technology has arranged to convert young engineers and architects into naval architects and shipbuilders to aid in designing and constructing vessels for America's great fleet of merchant ships.

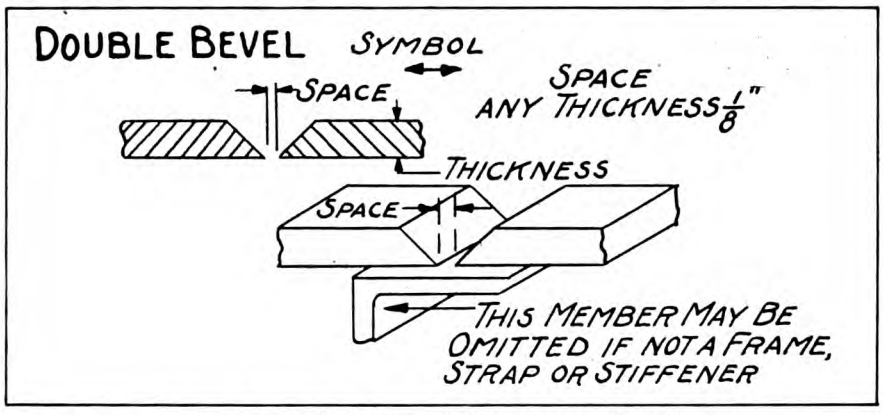


FIG. 23—DOUBLE BEVEL DESIGN OF ELECTRIC WELD

Double bevel is a term applied to the edge finish of two adjoining plates when the adjoining edges of both plates are beveled from one side only to an angle, the degrees of which are left to the designer. It is to be used when maximum strength is required and where the electrode can be applied from one side of the work only.

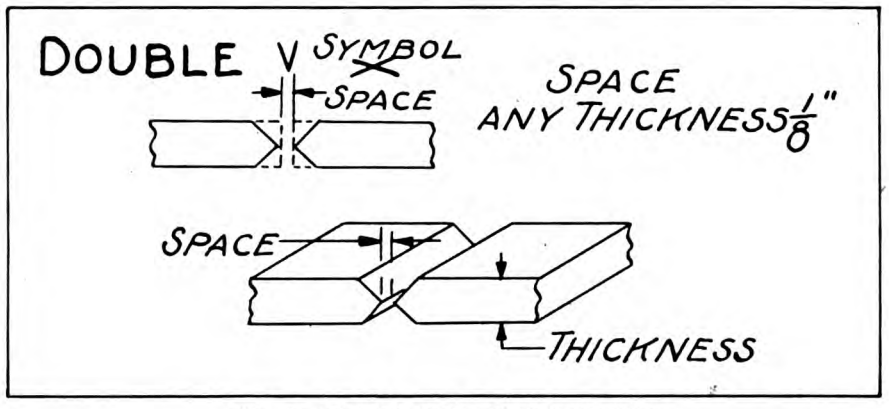


FIG. 24—DOUBLE-V DESIGN OF ELECTRIC WELD

The double V weld is a term applied to the edge finish of two adjoining plates when the adjoining edges of both plates are beveled from both sides to an angle, the degrees of which are left to the designer. This weld is to be used when two plates are to be butted together along these two sides for a maximum strength weld and only to be used when the welding can be performed from both sides of the plate.

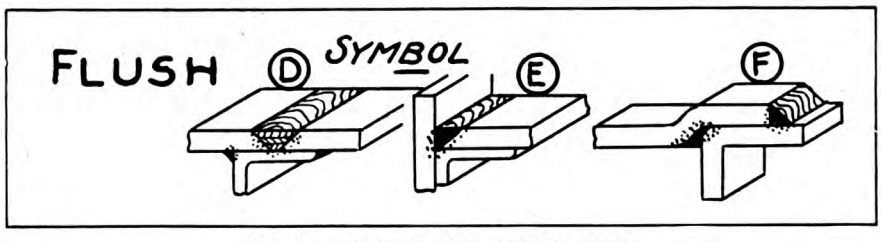


FIG. 25—FLUSH TYPE OF ELECTRIC WELD

Flush is a term applied to a weld when the top layer is finished perfectly flat or on the same plane as on the adjoining material, as shown at D and E, or at an angle of 45 degrees when used to connect two surfaces at an angle to each other, as at F. This type of weld is to be used where a maximum tensile strength is not important and it must be specified by the designer, together with a minimum number of layers of melding material.

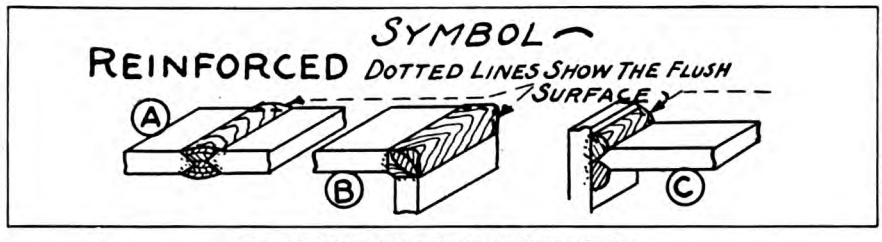
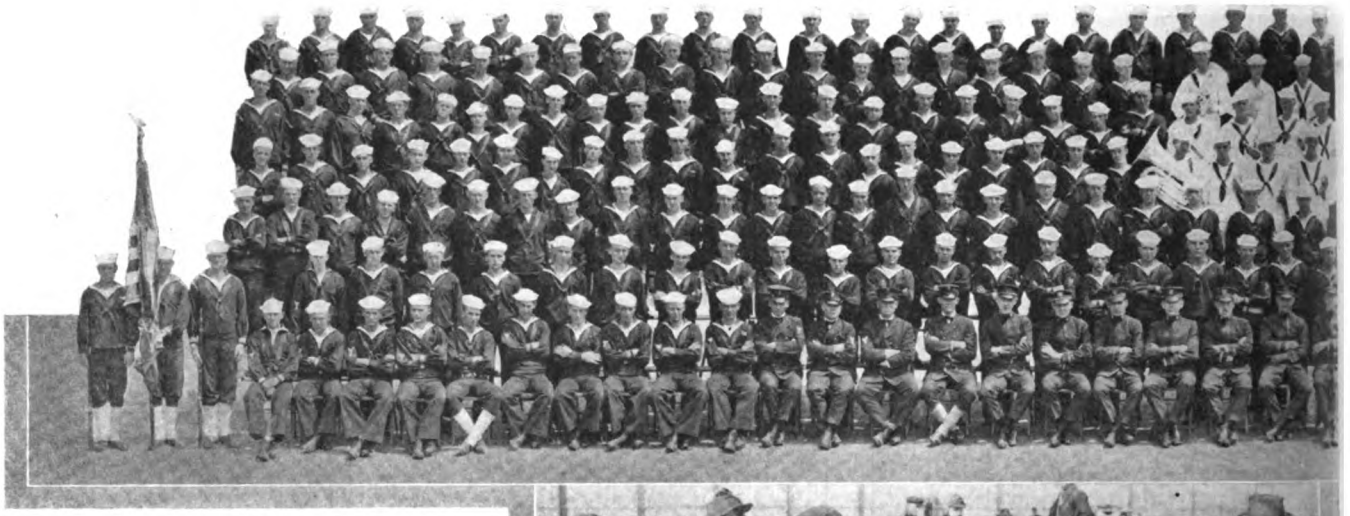


FIG. 26—CONCAVE TYPE OF ELECTRIC WELD

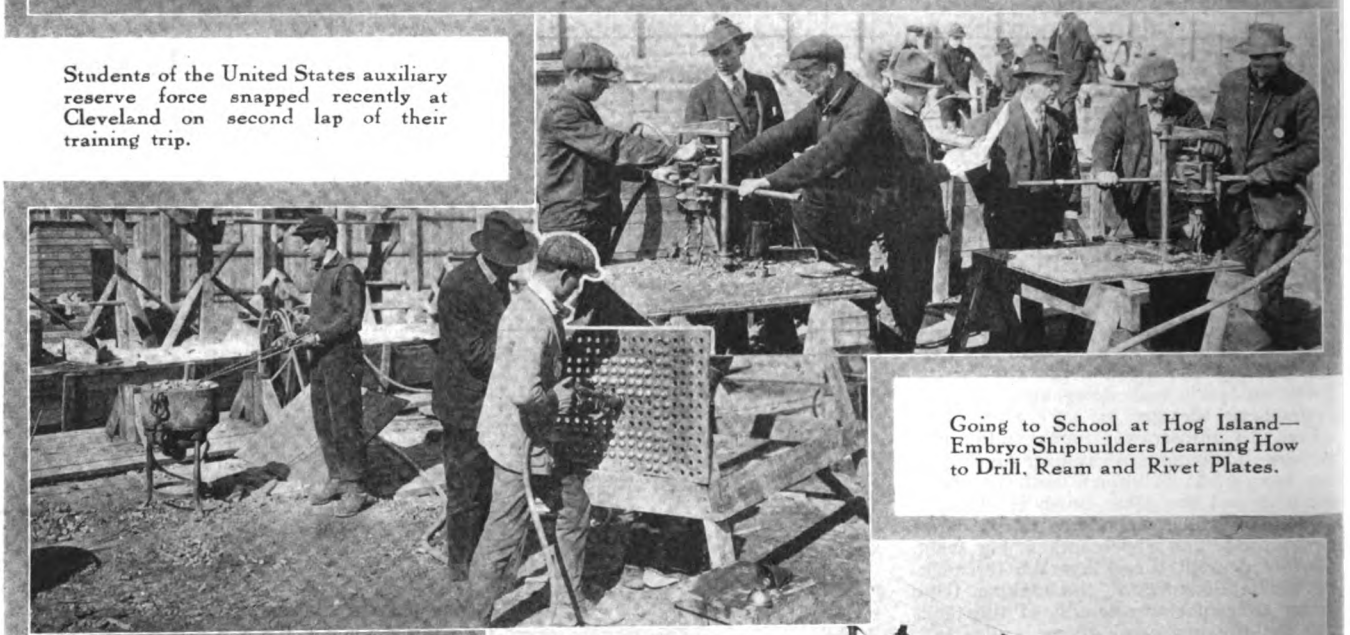
Concave is a term applied to a weld when the top layer finishes below the plane of the surrounding material, as in G, or beneath a plane of 45 degrees at an angular connection as shown at H and J. It is to be used as a weld of no further importance than filling in a seam or opening, or for strictly caulking purposes, when it is found that a minimum amount of welding material will suffice to sustain a specified pound-per-square-inch pressure without leakage. In this type of weld, it will not be necessary for the designer ordinarily to specify the number of layers of material, owing to the lack of structural importance.

Latest Marine News in Pictures

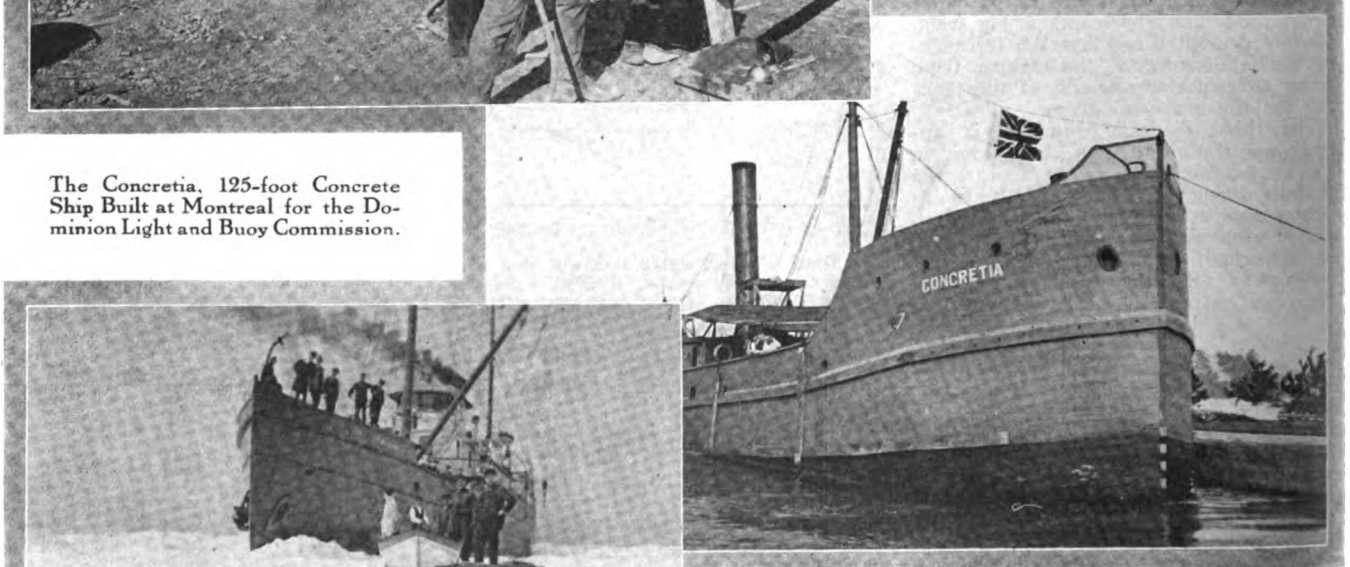
Payment Will Be Made for Acceptable Photographs



Students of the United States auxiliary reserve force snapped recently at Cleveland on second lap of their training trip.



Going to School at Hog Island—Embryo Shipbuilders Learning How to Drill, Ream and Rivet Plates.

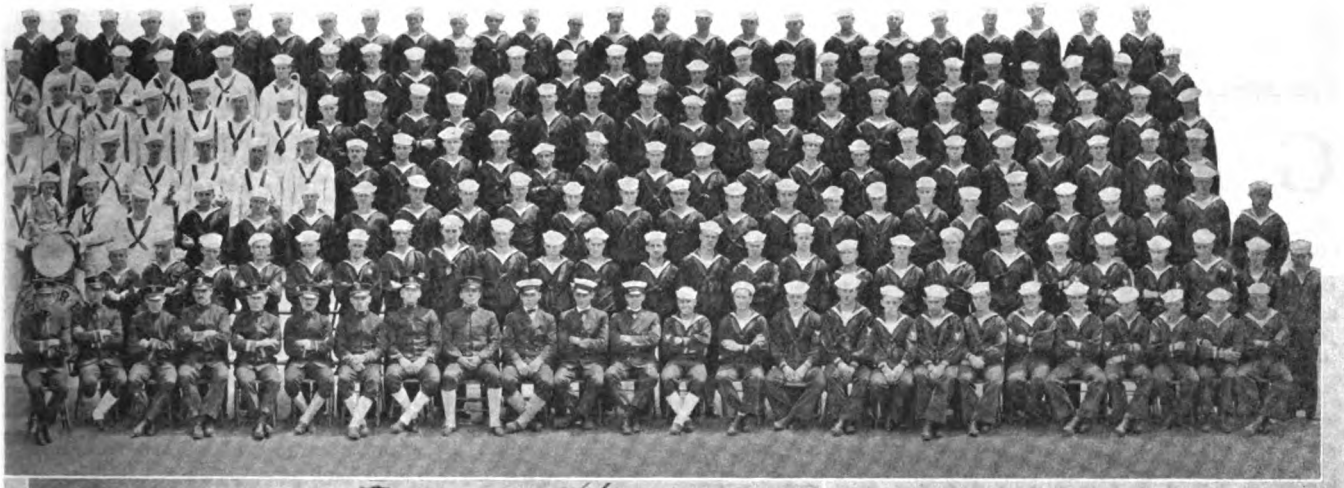


The Concretia, 125-foot Concrete Ship Built at Montreal for the Dominion Light and Buoy Commission.

An "arctic" scene on the Great Lakes. Tender Marigold ice-bound while landing lighthouse keepers at Sand island, Lake Superior.

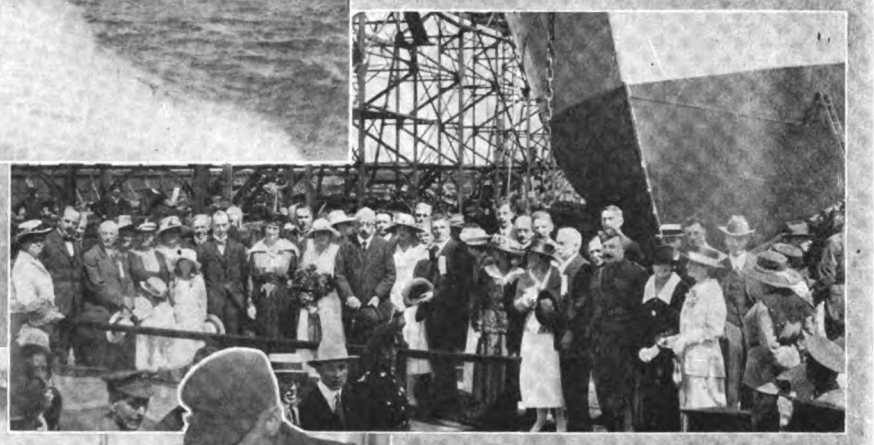
Photographs From Far and Near

Contributions for These Pages Are Solicited

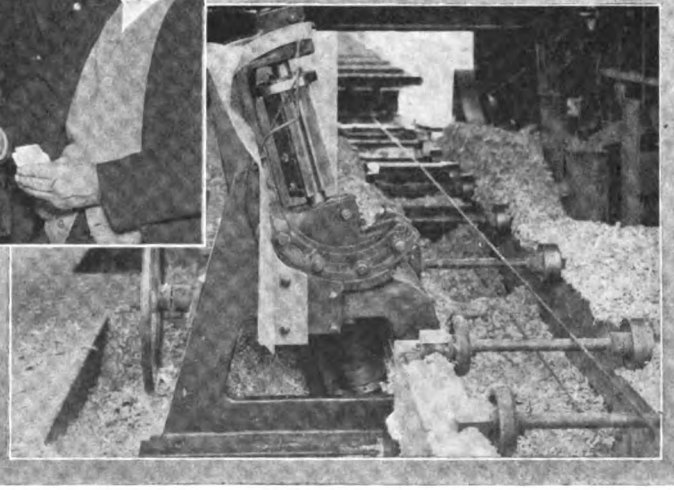


Uncle Sam is justly proud of these boys. Most of them have completed their training at Pelham bay and are now ensigns.

Rough Weather on the Great Lakes — A "Big Boy" Breaks Over the Deck of the Ore Carrier.



Distinguished Group of Canadians at launching of T.R. 12, Collingwood Shipbuilding Co., Collingwood, Ont.



Skipper and mate in friendly game at Sailors' home, Snug Harbor, N. Y. At right—War-time, labor-saving invention for beveling heavy ship timbers.

Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

G. A. TOMLINSON was recently appointed head of the newly created division of inland waterways, with offices at Washington. H. S. NOBLE has been appointed federal manager of the New York and New Jersey canals to succeed Mr. Tomlinson. Hereafter, the federal manager of the New York and New Jersey canals, the federal manager of the Mississippi-Warrior waterways and federal manager of other inland waterways will report to Mr. Tomlinson whose official title is director of the division of inland waterways. Mr. Tomlinson will take over the records and unfinished work of the committee on inland waterways, which has been discontinued as the principal functions have been discharged by the investigations and reports already made. Mr. Tomlinson had been a member of this committee and for some time has been a leading figure in inland waterways development. He is a director of the American Shipbuilding Co., Cleveland. He has been a prominent vessel operator in Duluth for many years.

* * *

EDWARD HENLEY has been named district supervisor for the United States shipping board at Pascagoula, Miss. He will act as mediator and adjuster of labor difficulties at Pascagoula, Moss Point and Biloxi, all in Mississippi. He was formerly president of the Central Trades and Labor council at Slidell, La.

* * *

M. J. COUSINS, formerly general agent in New Orleans for the Wabash railroad, has been appointed New Orleans agent of the Mississippi barge line of the railroad administration. He will have offices with HAYDEN W. WREN, superintendent of the port.

* * *

JOHN CARGILL, Philadelphia, has been named general manager of the Lone Star Shipbuilding Co., Beaumont, Tex., succeeding J. J. SCHULTHEISER, who resigned to build barges for his own company.

* * *

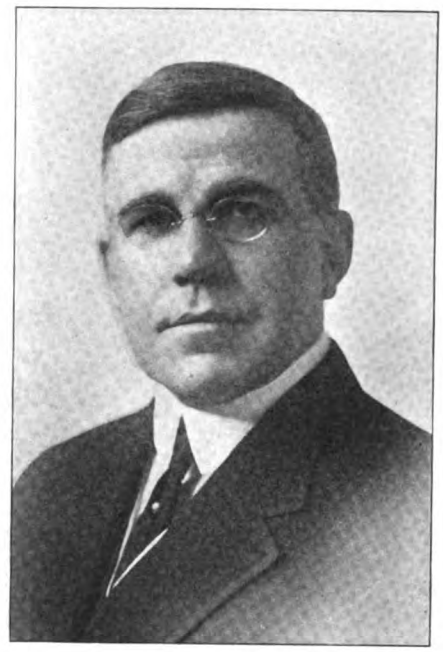
B. H. TRIPP, special representative of the Chicago Pneumatic Tool Co. on the Pacific coast, has succeeded M. W. PRISELER as district manager of sales for the Pacific coast territory. His headquarters are at 627 Howard street, San Francisco. The Los Angeles branch of the company at 521 Title Insurance building comes under Mr. Tripp's jurisdiction.

* * *

J. C. FORD, former vice president and general manager of the Pacific Coast Co., Seattle, has been appointed assistant district supervisor of wooden ship construction in the state of Washington district. The appointment was made from the Emergency Fleet corporation's Philadelphia headquarters. For many years Mr. Ford was one of the most prominent shipping men on the Pacific coast. He came to Seattle in 1899 to accept a position as superintendent of the Columbia & Puget Sound railroad, which is now known as the Pacific Coast railroad. Before coming to Seattle, Mr. Ford was connected with the Butte Anaconda & Pacific railroad, Montana.

* * *

CAPT. HARRY A. FIELD was recently appointed commandant of the Puget Sound navy yard. In looking over the yard, one of the first familiar sights to



G. A. TOMLINSON

greet Captain Field was the old receiving ship PHILADELPHIA. The vessel recalled memories of other days for it was upon her that he first saw service in Pacific waters in the early days of his career.

* * *

JOHN D. TWOHY was appointed general manager of the Seattle North Pacific Shipbuilding Co., Seattle, at a special meeting of the board of directors lately. Mr. Twohy succeeds J. E. SHEEDY who has retired. The change means an extension of the Twohy organization in the North Pacific plant.

* * *

CAPT. F. D. MCKAY, a veteran deepwater sailing-ship master, was recently appointed assistant to CAPT. S. B. GIBBS, chief surveyor in the Pacific Northwest for the San Francisco board of marine underwriters. He will be stationed at Seattle. Captain McKay recently took the sailing schooner AZALEA to the South Seas and upon his return he was employed as a pilot for the Foundation Co., serving in vessels built by that company at Tacoma, Wash.

* * *

SIR ARTHUR HARRIS, who since 1916 has been director of overseas transport for the Canadian government, has been appointed director general of shipping for Canada.

* * *

EDWARD B. GAY, JR., while maintaining his consulting engineering office in Philadelphia, has been appointed hull-works manager with the American International Shipbuilding Corp., Hog Island, Pa.

* * *

CAPT. J. H. MACNICHOL, who for the past three years has served the port commission of Seattle as agent of the Salmon Bay terminal, resigned recently to join the staff of the United States Shipping Board Emergency Fleet Corp., as chief officer of a steel steamship built on the Columbia river. While agent for the Salmon Bay terminal, Mr. MacNichol built up the terminal's business until it became one of the most important of the city's public properties.

* * *

CAPT. J. IRVING MAXON, United States inspector of vessels at Cornwall, Pa., has been appointed resident inspector of the Housatonic Shipbuilding Co., Stratford, Conn.

* * *

GEORGE H. WATERS has been appointed president of the Raritan Dry Dock Co Perth Amboy, N. J. Mr. Waters was formerly president of the George H. Waters Co., Mariners Harbor, N. Y.

* * *

CAPT. THEODOR KUNDSON is now general manager of the Vancouver, B. C., yard of the G. M. Standifer Construction Corp.

* * *

W. L. WOODROW has been elected president of the Old Dominion Steamship Co., to succeed H. B. WALKER who has resigned. Mr. Walker has accepted a position as federal manager of the coastwise steamship lines under the United States railroad administration.

* * *

W. G. RICHARDSON, lieutenant commander, U. S. N., has been transferred from the Charleston, Mass., navy yard to the government hydrographic office, Boston. Commander Richardson had charge of this office for 10 years, until a short time ago when he was detailed to the navy yard for special duty.

* * *

A. J. BARNES has been appointed export manager of the Shepard Electric Crane & Hoist Co., with headquarters at the main office at Montour Falls, N. Y.

"Iron Ships and Iron Men"

Making Naval Officers on the Great Lakes—How a Big War Problem is Being Solved

A lesson on the use of the pelorus by the captain

ON Aug. 29, 1916, congress passed a bill so sweeping and powerful in its scope that it was destined to alter completely the merchant marine and naval reserve policy of the United States. At the time this measure became a law it is, however, doubtful if any one person in that large assemblage which helped to create the law realized just how far-reaching in its power it was to become, for at that time our participation in the war was still seven months distant.

The naval reserve force bill, as it was named, classified the forces, such as ships and their personnel, which could act as auxiliary or reserve units to the United States navy in war or peace, into six distinct and independent divisions, namely, fleet naval reserve, naval reserve, naval auxiliary reserve, naval coast defense reserve, volunteer naval reserve and naval reserve flying corps.

The Naval Auxiliary Reserve

It is the intention of this article to deal exclusively with the third division of this classification, the naval auxiliary reserve. As originally planned this branch of the service was meant to include such vessels of the merchant marine together with their officers and crews which were considered suitable for use as naval auxiliaries in time of war and which were listed as such in the files of the navy department.

In other words the navy had marked for use in war certain liners, coastwise vessels and cargo boats and in order to take them over with their ship complements intact offered enrollment in the naval auxiliary reserve with ranks or ratings corresponding to those held in the merchant marine. Captains of the boats were to be enrolled as lieutenant commanders, the highest obtainable rank; chief engineers were to be senior grade lieutenants; lower officers to be junior lieutenants or ensigns as their status aboard ship warranted. Members of the crew were to be signed up as petty officers or seamen. As an inducement to enter this reserve in peace time, officers were offered one twelfth and members of the crew one-sixth of the earnings which they would receive on a wartime basis in addition to their ordinary remunerations. Enlistments were for four years and at the expiration of those periods the plan calls for an increase of 25 per cent in the annual retainer for both officers and crew, upon their re-enrollment.

Upon the entrance of the United States into the war, all the vessels enrolled in the naval auxiliary reserve were automatically taken over by the government. But this comparatively great increase in vessel tonnage was as nothing when the physical conditions surrounding the prosecution of the war necessitated the transportation of an armed force of millions, to say nothing of almost inconceivable amounts of supplies, guns, ammunition, etc., to a point 3000 miles distant across the water. It was then that the naval auxiliary reserve began to be organized to the proportions which it has assumed today.

Ships, ships and more ships became the cry of the hour. Sounded first in the navy department it was echoed up and down the coasts and broadcast through the country. Existing shipyards were given contracts for additional tonnage which in normal time would have swamped their capacities. Bleak shore lines almost overnight were transformed into bustling centers of industry. Plans were made to build thousands of vessels, to turn them out at the rate of two and three a day. To man the ships tens of thousands of men were recruited and hustled off to huge concentration camps where they were given intensified courses in practical seamanship and in other vital requirements.

Where to Find Officers

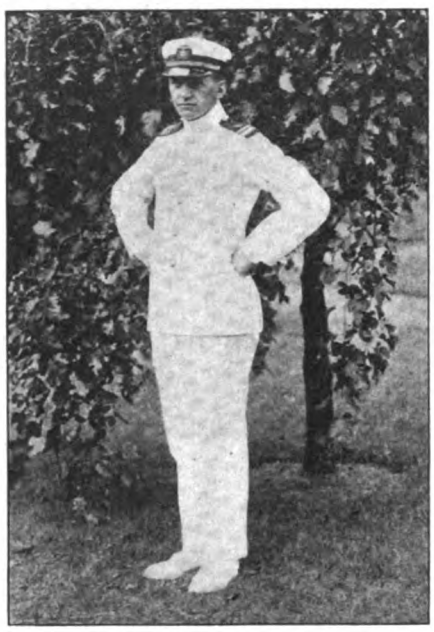
But with plans for the completion of the ship program well under way and the problem of equipping each individual vessel with a full crew partly solved, one gigantic task still remained to be performed, that of securing for them the necessary deck and engine room officers.

LIEUT. (Senior Grade) JOHN H. CLARK
Commanding Officer U. S. N. A. R. Receiving Ship Cleveland

To equip the ships with officers! That was the last remaining problem dealing with our naval auxiliary reserve with which our navy department would be forced to cope. How was it to be done? No one seemed to know. A superficial consideration might label this task trivial when compared with the magnitude of the others, but in reality it was an enigma with which no one knew how to grapple.

A Real Problem

Officers must have a comprehensive insight into navigation, a study so broad that it is a science in itself. They must be familiar with every part of their ship from stem to stern, have a working knowledge of all kinds of signals, know all pilot rules, buoyage systems and other less important subjects too numerous to mention before they can ever hope to receive a commission. Officers in the merchant marine attain their status after years of gruelling experience aboard ship. To become officers in the navy young men must go through a course of four years' work at the naval academy at Annapolis with the addition of two years' further training as junior officers aboard ship after graduation. But officers were needed almost immediately to be placed aboard the ships which were rapidly being completed under the concentrated program of the Emergency Fleet corporation and neither of the above methods could secure them.



LIEUT. (Senior Grade) JOHN G. WEORPEL
Executive Officer, U. S. N. A. R. Receiving Ship and instructor in pilot rules

This was the situation on a certain afternoon in the summer of 1917 when a group of high naval officials gathered in Washington for the purpose of discovering a solution to the problem. Both of the above methods of securing officers were thoroughly considered even though all officers present at the meeting realized their impracticability. But they also realized that officers could only be secured through the routine of preparation, and it was finally decided that some method of intensified training for well educated men, combining the salient features of the course at Annapolis with a certain amount of practical training on board vessels, must be worked out. College men could be secured to fill in the gap because they had received the academic training, secured in other schools, which comprises a considerable portion of the training secured at Annapolis and thus would only have to take up, in the remainder of the course at the naval academy, the vital points of seamanship and navigation. Their knowledge of the higher mathematics would enable them readily to compute logarithms. Navigation could be taught at training stations, or at schools or colleges that could be selected for that purpose. Likewise mathematics could be reviewed at these stations by college men of the older order who might have partly lost track of them.

But where could men become skilled in the practical side of seamanship which could only be gained by actual experience aboard ships? Navigation and the theoretical part of their training could be acquired ashore, but practical requirements such as seamanship could only be secured in their native element, the sea. It was, naturally, admitted in advance that many of the men who would take the course would know little or nothing of steamers and many would never have sailed on one.

Plan for Training

As outlined by the supervisor of the naval auxiliary reserve, the intensified training of future merchant officers is divided into three distinct periods. The training aboard the ore carriers of the Great Lakes constitutes the second period. Upon enlisting in the naval auxiliary reserve, the recruit is first sent to the municipal pier, Chicago, where a government school is conducted for elementary training. At this school the recruit is hurried through the fundamentals of naval service, learning the manual of arms and drill formations, taking up outfitting and receiving work, first aid principles, elements of navigation and other subjects of a similar nature.

The allotted time for this portion of the training is generally from four to six weeks. The cadet then is sent to Cleveland for the second period. He receives two months' work aboard the ore carriers, for experience in practical seamanship. At the end of this period, he returns to Cleveland for examination in the subjects taken up aboard the ore carriers.

Until recently, the plan called for direct shipment from Cleveland to the Pelham bay, New York, officers' school, for the third and final period of training. A change in the supervisor's plans in the early part of July, however, specifies that the men were to be returned to Chicago for further examination and for a week's course aboard a naval ship, the GOPHER, *manned entirely by naval reservists. From Chicago the reservist is sent to Pelham, where his time is devoted to the study of navigation, ordnance and regulation. At the end of the allotted two months' period, he is given, if successful in his examinations, a commission as ensign in the United States Naval Reserve Force and is sent aboard a troop or cargo transport as a junior officer.*

World's Best Training Station

It was at this point that someone conceived the idea which forms the foundation of this article. Why not use the Great Lakes, a veritable inland ocean, for the consummation of the plan? The geographical location was satisfactory and hundreds of vessels were available.

Everyone admitted that the Great Lakes would be a perfect El Dorado but "what could be done about training ships?" There were no training ships on the Great Lakes.

"Use the bulk freighters," suggested another officer present, "the huge ore carriers plying from Duluth and Superior to the lower lakes."

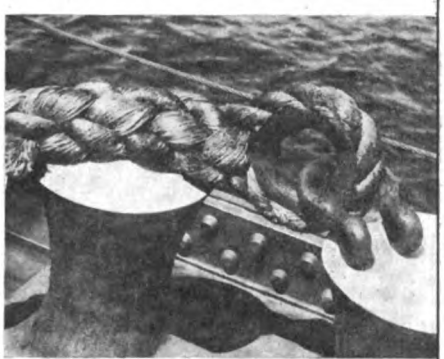
The idea was enthusiastically received and to the supervisor of the naval auxiliary reserve, was entrusted the responsibility of formulating a definite working plan for experimentation.

In conjunction with the plan of stationing men on the lakes it was likewise decided at that time to make arrangements for placing men on the coastwise vessels of the Atlantic ocean trade.

Cleveland was chosen as the most suitable site for a training station due not so much to its convenient location on the lakes as to the fact that it is the headquarters of most of the large shipping companies. Lieut. John H. Clark, assistant supervisor, naval auxiliary reserve, was placed in charge and entrusted with the responsibility of conducting the experiment. He was well qualified for the work, being not only well familiar with the navy routine gained by actual experience aboard the U. S. S. ARKANSAS, but he had in addition held master pilot's papers for sailing vessels on the Great Lakes. In other words, he had captained the very ore carriers on which he was now about to place men for training in practical seamanship and hence knew exactly what the limitations and benefits were that could be attained from such a training.

Ship Owners Co-operate

Arriving in Cleveland on Aug. 28, 1917, Lieutenant Clark proceeded immediately to recruit men and give them such preliminary instructions as would better enable them to take full advantage of their time during their



Splicing is an Important Feature of Training

THE two pictures at the top of the page and the one in the lower left hand corner show reservists at work on the task of putting an eye splice in a mooring cable under the supervision of "Pete." Pete, himself, is shown in the lower right hand corner. The making of an eye splice is an exceedingly difficult task requiring hours to complete. Moreover it requires considerable dexterity correctly to manipulate the heavy strands into place. All reservists are required to have an intimate knowledge of splicing, to a degree where they can make any type unassisted. Upon their return to the receiving ship at Cleveland they are tested in practical seamanship and their ability to splice correctly is an important factor in their examinations.

The picture at the center left shows two reservists at work on a splice in a manila mooring hawser, which they have practically completed. The man at the left is tucking the final strand into place with the fid which he is holding in his hand. At the upper right is shown the completed splice and its even and symmetrical lines and tucks show how well the reservists have learned the art of splicing under the masterful tutorship of their corpulent instructor.

Letter from Steamship Companies to Masters of Vessels With Reference to Training of Naval Reservists

Captain .....

Steamer .....

THE naval auxiliary reserve of the United States navy has arranged with our company to place aboard our ships, for training in seamanship, naval reservists, who are in process of intensive training that will fit them to be officers and petty officers in the naval service.

These men are a part of the naval force of the nation and as such are subject to the rules and regulations for the government of the naval force and they have been instructed, by naval officers, that upon reporting aboard your ship and until relieved or transferred they will obey implicity your orders and instructions.

You will enter these men on the articles as apprentices at the rate of wages of $1.00 per month or part thereof.

Their names will be entered on any crew lists you send to the lake carriers' association, but they will not be asked to join the welfare plan or any other organization or association.

You will assign them to duty on the basic plan of watch and watch, and to the end that they will be given three hours of each day for the book work or theoretical side of seamanship, preferably the hours from nine to twelve of the morning watch and from three to six of the afternoon watch and three hours' duty in the pilot house actually steering, or else closely studying the actual handling of the ship.

During the other six hours of the working day, the routine is left to your discretion and you will assign them duty, to the end that they may gain a thorough practical knowledge of marlinespike seamanship; general ship construction; use of the compass and pelorus; the handling of deck engines, windlass, steering engines; the use of the hand-lead, deep-sea lead, and patent log, and general care of a ship and how to supervise the maintenance work aboard ship; the fundamental principles of ship handling and piloting, in short, that they may be enabled to gain a general practical knowledge of seamanship, that together with the theoretical knowledge gained through book study they may qualify, upon leaving your ship, at least as competent petty officers.

The consensus of opinion of all masters approached being that an essential part of an officer's training is the thorough knowledge gained through actually steering the ship, in other words, "the feel of the ship," it is considered essential that they be given a great amount of practice in actually steering the ship. When in port, and in your judgment you deem it advisable to grant them shore liberty, you will order them to report at a specified hour, and will purposely specify an hour well in advance of your probable sailing time. This is to guard against the possibility of unlooked for developments that might operate to advance your sailing time, and not in any way to protect them in returning later than the hour specified, and you are to hold them strictly to account in this matter, as punctuality is an important consideration of naval discipline.

But as it is considered essential that these men gain the greatest possible amount of experience during the limited time they are aboard the ships and a great deal of knowledge can be gained from the work in port, it is not thought that it will be advisable to grant them but very little shore liberty and it is considered advisable that requests for shore liberty should be made to the first officer, who will signify his approval or disapproval of the request, to you, and it is considered inadvisable to grant more than one naval reservist liberty at the same time.

These men will be instructed before coming aboard your ship to accord yourself and your licensed officers the courtesy and salutes that are an essential part of naval discipline, and the practice of this etiquette will keep them from growing stale while aboard your ship, and it is entirely within your discretion to discontinue its practice, if you so desire. It has been suggested that for the purpose of greater safety and to guard against possible treachery it might be well to station a naval reservist, at certain strategic points, aboard ship such as, windlass room, also steering engine room or near the steering quadrant during the time that your ship was in the narrow stretches of the rivers, such as Little Rapids cut, Neebish channel and Livingstone channel and you will be guided by your judgment in this matter.

Each naval reservist will have written instructions relative to the subjects he is to study and make notes on, also instructions from the assistant supervisor defining his status while aboard your ship and copies of these are enclosed herewith for your information.

The assistant supervisor is desirous of securing your judgment regarding the fitness of these men, and it is requested that you fill out the fitness report that will be furnished you, and give him the benefit of any suggestion that may occur to you.

As the course is so very intensive and the incentive to do well so great, it is not intended that any man, not showing the proper spirit in keeping with this, should be continued after his unwillingness to apply himself becomes apparent to you, and in any case of this kind coming to your knowledge you are directed to immediately telegraph the assistant supervisor, naval auxiliary reserve, Guardian building, Cleveland, Ohio, who will take the necessary measures, to the end that the man in question may be taken off your ship and another reservist substituted.

I wish you to know that in my opinion you can render no greater help to your country at the present time, than to take the greatest possible interest in the development of the men placed aboard your ship. I want you to give these men your own personal attention, and make the reports the government requires of you most carefully. If the men prove keen and adaptable, I want you to go as far as you can in teaching them boat drills, fire drills, handling of anchors and chains, use of lead and taking of bearings, and any or all such things as occur to you that may, or may not be prescribed. In short I want these men to get the utmost possible instruction and information all the time they are aboard your ship.

Sig.....

Pres. Steamship Co.

period of training on the lake boats. H. Coulby, president of the Pittsburgh Steamship Co., Cleveland, had previously been approached in regard to the idea of giving the cadets their training on the lakes and had given an enthusiastic permission when requested to allow the experiment to be performed aboard one of the boats of the Pittsburgh Steamship line.

By Sept. 17, the first two young men had completed their preliminary work and were placed aboard the steamer W. B. DICKSON of the Pittsburgh Steamship Co.'s fleet. In rapid succession additional men were hurried on to the boats to enable as large a number as possible to take the training before navigation should be closed for the season. In all, approximately 250 men were stationed on the boats during the remainder of the season until the advent of cold weather put an end to navigation.

The success of the experiment may be judged from the following report submitted at the end of the season:

"On Sept. 17, 1917, through the courtesy of Mr. H. Coulby the navy was enabled to place aboard the steamer DICKSON of the Pittsburgh Steamship Co. two naval reservists for an intensive training course in seamanship. This was to be one phase of a three-phase training course designed to fit qualified men to become officers in the naval service. During the balance of the navigation season there were trained on the Great Lakes 250 reservists, of whom approximately 150 have since completed their schooling, received commissions and are now on naval ships. During this period the system was extended to cover approximately 120 of the ore carriers on the lakes, this being made possible by the great interest in the work taken by Mr. Coulby and his associates, the vessel owners. This resulted not only in affording the navy department needed facilities to carry on the work, but also in a more sympathetic understanding of the work by the masters and officers upon whose shoulders the full responsibility for the ultimate success of the experiment was placed.

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A REGULAR FROM THE U. S. NAVY INSTRUCTING NAVAL RESERVISTS IN THE CORRECT METHOD OF STOWING A HAMMOCK

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BOAT DRILL—THE COXSWAIN IS WELL QUALIFIED AS AN INSTRUCTOR AS INDICATED BY THE FOUR SERVICE STRIPES ON HIS SLEEVE. EACH OF THESE STRIPES MEANS A FOUR-YEAR ENLISTMENT

TAKING A BEARING

The results obtained in the short period before the close of navigation were so uniformly successful that plans were made for the further extension of the work during the season of 1918.

"To further this project, the assistant supervisor was assured by ship owners that the maximum number of men that could be accommodated would be carried, and he was afforded every opportunity to meet and acquaint the masters with his needs and aims."

* * * *

Adding to a Big Job

This then was the result of the experiment of placing men on the Great Lakes for training. Little could be done over the winter, but nevertheless, Lieut. Clark remained at the station in Cleveland, now swelled to greatly amplified proportions, recruiting new men, giving them as much training at the receiving ship as was possible under the somewhat hampered conditions.

* * * *

In early January an event occurred which made the lieutenant realize the magnitude of the task which lay before him for the present season. Summoned to New York to give a more detailed report of his plans for the present year, he carefully defined to the supervisor his intentions of handling a greatly increased number of men and also of calling upon the assistance of additional steamship lines to aid him.

At the conclusion of this explanation, the supervisor shot at him the direct question, "Mr. Clark, how many men can you turn out from the Cleveland station during the forthcoming year?"

"Sixteen hundred, sir," came the response, with a promptness which enabled the supervisor to realize that it was the result of a previously calculated estimate.

Like a thunderbolt from the sky fell the answer clearly and distinctly upon the ears of the amazed assistant supervisor.

"Mr. Clark, the program of the Emergency Fleet corporation is being consummated with a rapidity which will make the demand on us far greater than 1600 men. You will consider your quota 2400 men."

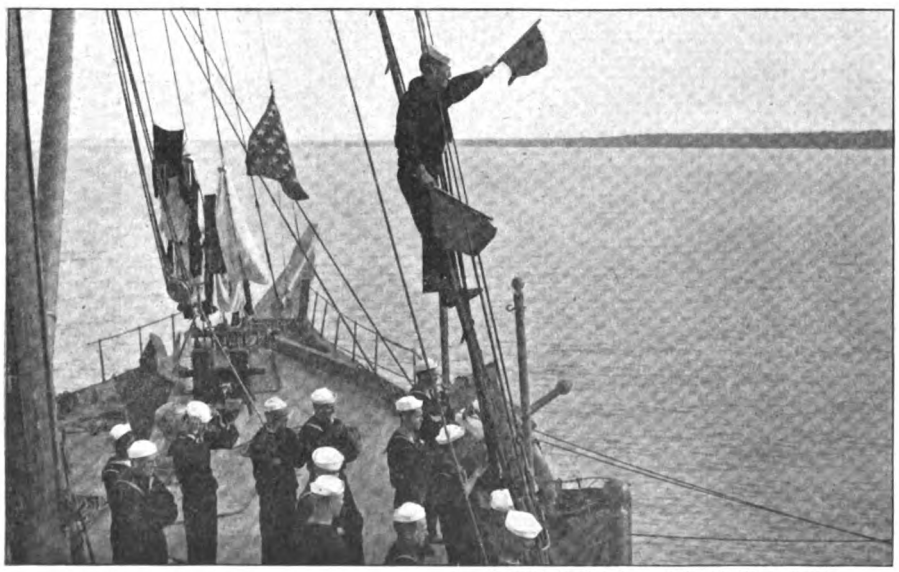
Although the assistant supervisor thought volumes, he merely responded, "Yes, sir."

* * * *

In the latter part of April, about two days before the navigation season for 1918 was formally opened on the Great Lakes, there were gathered at the receiving ship in Cleveland approximately 250 naval reservists, a number which sadly taxed the capacity of the comparatively small building. A fine looking crowd they were, young men the very picture of life and vitality, attracted from the colleges and universities by a common impulse, that of entering the service with one of the coveted commissions. Older and more dignified men were likewise included in that gathering, men who had left their college days far behind and had launched deeply into the business world.

The reservists were drawn up in little knots and groups over the deck engaged in animated conversation. The same subject seemed to characterize most of the conversations, however, that of the impending opening of navigation, due to begin in a day or two, and which would in the course of a week drain the armory of practically every man present. Conversation was at its height when the order came, bawled from the husky voice of the chief boatswain's mate. "Fall into your quarters." The men obeyed with an alacrity which was

LOWERING THE BOATS—WHEN THE CAPTAIN GIVES THE SIGNAL FOR THIS DRILL WHICH IS HELD AT LEAST ONCE A WEEK ABOARD THE ORE CARRIERS, THE NAVAL RESERVISTS TAKE PART WITH THE CREW.



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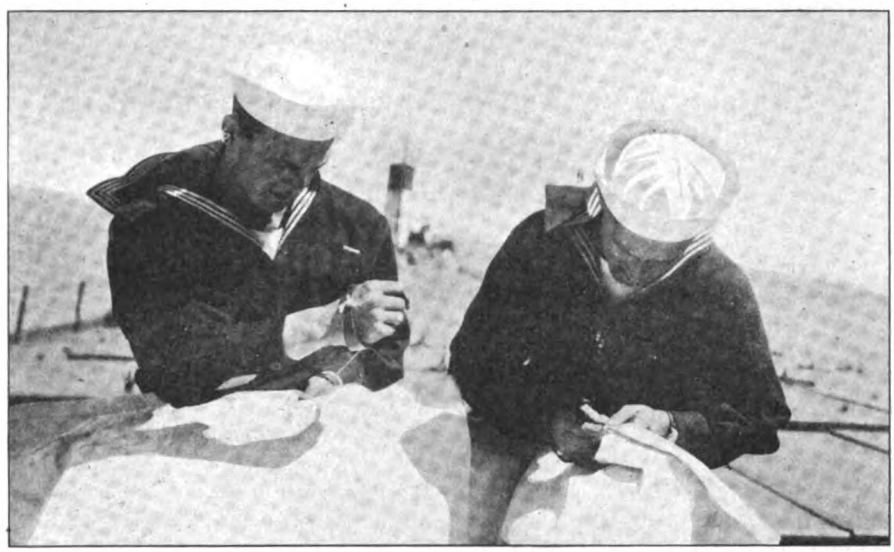
"SOMEWHERE" ON LAKE MICHIGAN—SENDING SEMAPHORE SIGNALS FROM THE RIGGING OF A TRAINING SHIP

ANOTHER LESSON ON THE PELORUS



SEWING CANVAS FOR SAILS AND OTHER PURPOSES. CADETS MUST HAVE AT LEAST AN ELEMENTARY KNOWLEDGE OF THIS WORK.

not diminished any by the sudden appearance of the commanding and executive officers.

Ordered to the Ships

Rumor had gone the rounds until it was now considered a certainty that the visit of the commanding officer was for no less a purpose than to throw some light on the imminent "emigration from the armory." A tense hush of expectancy accordingly overhung the ranks while the men eagerly awaited developments. They were not long in materializing. The door to the office on the "bridge" was suddenly opened and the officers accompanied by yeomen came out and descended to the "main deck."

Without plunging into any preliminary, the skipper stated briefly, "The following men will hold themselves in readiness to leave town at 10:15 this evening to enter upon the next step of their training, namely that on the ore carriers." Followed a list of about fifty names read by one of the yeomen.

"These men will fall in immediately on the port side of the 'quarterdeck'," continued the skipper, "and will there receive their shipping instructions and preliminary information as to the pursuance of their duties while aboard."

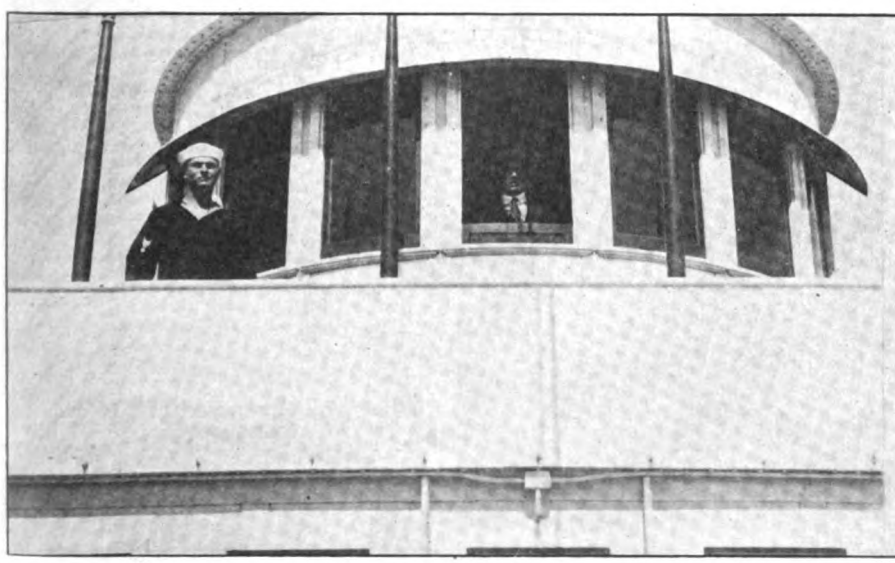
* * * *

Change in Regulations

Naval reservists who received training aboard the lake boats in the previous fall, had worn their civilian clothes; in fact they wore no uniform at all until they had gone through the officers' training school at Pelham Bay; this year, however, the reservists are compelled to wear them during the entire period of their training, being fitted out as soon as they first reported for duty.

Again, in the season of 1917, the men were given no preliminary instructions other than to learn as much as possible about practical seamanship, pilot rules, navigation and other subjects of a similar nature. To this end they were also advised, but not compelled to take text books with them to study from.

In the present season each man is given a copy of a small book of



THE SAILOR IN THE LEFT HAND ILLUSTRATION IS JUNIOR OFFICER OF THE DECK. THE SHIP IS LEAVING PORT AND STATIONED ON THE DECK ARE ADDITIONAL RESERVISTS ACTING AS LOOKOUTS, WHO REPORT TO THE JUNIOR OFFICER EVERYTHING OF IMPORTANCE SUCH AS PASSING SHIPS, BUOYS, LIGHTS, ETC. THE JUNIOR OFFICER IN TURN REPORTS TO THE OFFICER IN CHARGE OF THE BRIDGE. AT THE RIGHT, IS A STALWART RESERVIST AT "WIGWAG" DRILL

Subjects With Which Naval Reservists Must Familiarize Themselves ---Detailed Reports Are Required on Each

1. GENERAL CONSTRUCTION OF SHIP

(a) Basic Construction:—
1. Keel,
2. Frames,
3. Beams,
4. Hull Plating (skin)

(b) Divisions:—
1. Bulkheads,
2. Cofferdams,
3. Double Bottoms,
   (a) Trimming tanks,
   (b) Fresh water tanks.
4. Compartments —
   (a) Cargo holds,
   (b) Fire and Engine rooms,
      1. Shaft alleys,
      2 Bunker and fuel oil tanks.
5. Decks.—
   (a) Nomenclature,
   (b) Fittings (hatches, stanchions, etc.)
6. Drainage —
   (a) Main,
   (b) Secondary,
   (c) Scuppers,
   (d) Bilges,
   (e) Wells,
   (f) Bilge suctions (strainers)

(c) Rigging.—
1. Shrouds and stays,
2 Booms,
   (a) Rigging and unrigging,
   (b) Lifts, purchases and guys

(d) Care and Inspection of above.

BOATS — GEAR AND LIFE SAVING EQUIPMENT

1 Boats,
(a) Types:—
1. Merchant,
2. Navy.
(b) Construction and Measurement for capacity
(c) Equipment.
(d) Method of handling, securing, and launching

2 Life Saving Equipment
(a) Types.—
1. Rafts,
2. Belts,
3. Buoys.
(b) Method of handling, securing, and stowing

3 Care and Inspection of above

WEATHER AND LAWS OF STORMS

1 Weather,
(a) Weather signs,
(b) Types of clouds,
(c) Barometer indications

2. Laws of Storms,
Cyclonic,
(a) Origin,
(b) Indications,
1. Sea,
2. Shifts of winds,
(c) Determination of ship's position in respective semi-circles.

3. Manoeuvering Ship,
(a) To avoid storm center,
(b) Heaving to,
(c) Running before it.

4. Trade Winds.

SIGNALS

1 Navy Code Flags,
(a) Alphabet,
(b) Special Flags,
(c) Special uses of all.

2. Semaphore,
(a) Uses.

3. Dot and Dash Code.
(a) Uses.

4. Thorough knowledge in sending and receiving required.

MOORING

1. Mooring Ship,
(a) At Dock,
1. Preparations
(b) Stations,
1. Officers and men,

2 Lines—(Heaving, Mooring),
(c) Manoeuvering,
1. In approach,
(a) Judging tide,
(b) Action of propeller, single or twin screw,
2. Coming alongside,
(a) Handling of lines,
1. Springs,
2. Breasts,
3. Bow,
4. Stern.
(d) Securing,
1. Lines,
2. Fenders,
3. Gangways

2. Unmooring Ship.
(a) Preparations,
1. Testing,
2. Reporting ready,
3. Sling lines and casting off

3. Anchoring,
(a) Preparation,
1. Getting anchor ready for letting go,
(a) Old Style,
(b) Patent,
2. Lead Lines,
(b) Manoeuvering,
1. Speed of ship
(c) Amount of cable.
(d) Mooring with two (2) anchors,
1. Advantages,
2. Disadvantages,
(e) Securing.

4 Weighing Anchor,
(a) Preparation,
(b) Heaving in,
(c) Clearing foul anchor,
(d) Securing.

STOWAGE OF CARGO

1 Preparation of Hold,
(a) Inspection of Bilges and Bilge Suctions,
(b) Laying of Dunage.

2. Methods of stowage in different types of cargo
(a) General cargo:—
1. Case goods,
2 Bales,
3. Casks
(b) Coal,
(c) Iron,
(d) Timber,
(e) Explosives,
(f) Acids.

GROUND TACKLE—STEERING GEAR—DECK FITTINGS

1. Ground Tackle,
(a) Anchors:—
1. Patent and old Fashioned,
(a) Bower, stream, kedge and boat.
(b) Windlass:—
1. Care and operation,
(c) Controller or Compressor,
1. Care and operation.
(d) Cable:—
1. Marking—(Navy, Merchant),
2. Stowage—(Chain lockers),
3. Care and inspection.
(e) Securing for sea and preparation for anchoring.

2. Steering Gear.
(a) General Plan,
(b) Types of Transmission,
1. Cable,
2. Shafting,
3. Telemotor gear.
(c) Emergency gear,
1. Location and kind.
(d) Care and operation.
(e) Rudders and Jury Rigs.

3. Deck Fittings.
(a) Cleats, chocks, and bitts,
(b) Capstan and winches.

BRIDGES AND NAVIGATION APPLIANCES

1. Bridge.
(a) General arrangement:—
1. Compass,
2. Wheel,
3. Annuciators or Engine Room telegraphs,
4. Bell Pulls,
5. Rudder Indicators,
6. Whistle,
7. Pelorus,
8. Running lights,
1. Switches,
2. Electric and emergency oil lamps,
9. Signal locker,
10. Emergency signal gear,
11. Submarine signals,
12. Barometer,
(a) Mercurial,
(b) Aneroid,
13. Thermometer, (wet and dry),
14. Log book,
15. Order Book,
1. Captain's night,
2. Executive's morning.

2. Navigation Appliances,
(a) Patent Log,

3. Care and Operation of above
(b) Lead,
(c) Sounding Machine.

MARLINSPIKE SEAMANSHIP

A thorough knowledge of ropes and marlin spike seamanship:
(Blue Jacket's Manual pages 259 to 269)
(Knight's Seamanship pages 24 to 54)
In report draw the following knots and give their use:
1. Figure-8 knot,
2. Reef or Square Knot,
3. Bowline,
4. Running Bowline,
5. Sheep Shank,
6. Round Turn half hitch
7. Clove Hitch,
8. Timber Hitch,
9. Marlin Hitch,
10. Carspaw,
11. Becket Bend,
12. Bowline on a Bight.

Also learn to make a short splice, eye splice, and long splice and their different advantages and use.

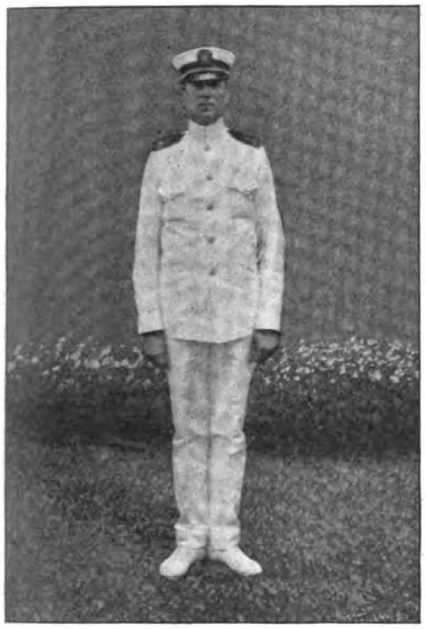
WATCHES AND DRILLS

1. Watch, Quarter and Station Bill,
(a) General arrangement and provisions.

2. Drills:
(a) Fire and Collision:
1. Stationing Officers and Men,
(a) Special Details,
2. General Duties,
(a) Emergency measures to be taken at discovery of fire.
(b) Abandon Ship:
1. Stationing Officers and Men,
2. General Duties.
(c) Rescue:
1. General Duties,
(a) Man overboard,
(b) Rescue of people from vessels in distress,
(c) Assist vessels on fire,
(d) Prevention of spread of flames to other shipping.
(d) General requirement at all drills.

RULES TO PREVENT COLLISION OF VESSELS

1. International Rules.
2. Inland Rules,
(a) Comparison with above.
3. Thorough knowledge of above required.



ENSIGN ROBERT WEXLER
Second in command of the "ship" at Cleveland and instructor in practical seamanship

printed instructions which arranged his entire time on shipboard. An example of this outline is shown in the table on page 506. Each man is likewise compelled to take with him a set of standard volumes on navigation and seamanship.

On board ship the periods of work are split into watches, and the reservists are required to stand these on the basic principle of "watch and watch" in the same manner as the members of the crew. If four men are assigned to one vessel, two must stand the "forward" and two the "after" watch, making 12 hours of duty for each of the four men. The forward watch must stand duty from 6:15 to 12:15 morning and evening; the after watch from 12:15 to 6:15 morning and afternoon. The working program of the cadets during watch is left to the discretion of the captain save that the cadet is compelled to study three hours, and take a three-hour trick at the wheel each day.

Learning to Steer

To familiarize the naval reservist with lookout duty, the importance of which cannot be overestimated to them due to the fact that they will be junior officers at sea, they are stationed as lookouts for approximately three hours each night. Every cadet must also master the art of steering in the two months during which he is aboard a lake vessel, this being another of the necessary requirements of a junior officer at sea. An amusing incident is told about a watchman going up into the upper pilot house to interview the mate. Looking out of a window he noticed a long circular wake in her stern.

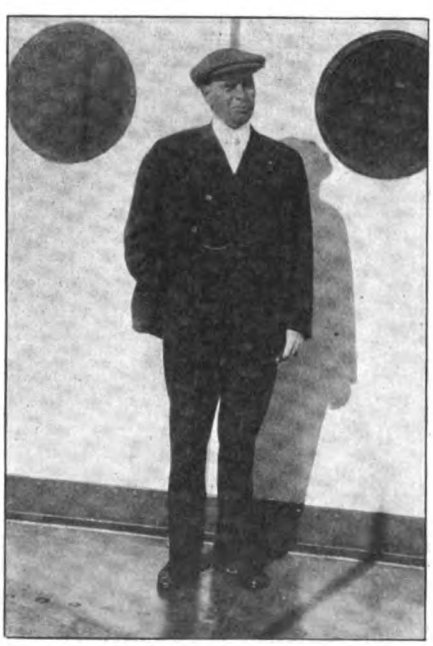
"I didn't know you changed your course out here," he remarked.

"Change hell," rejoined the mate. "We just got a new lot of jacks on board the boat and one of them is taking a trick at the wheel." Then in a much more gentle tone of voice he called down to the lower pilot house, "Hey, Jack, you're giving her too much port wheel. Steady her up. and watch her close. Keep your eyes on the compass."

While many of the cadets have considerable trouble in mastering the art of steering, others seem to pick it up readily, not only being able to hold a true course in the open lakes but apparently having little difficulty in keeping the cumbersome steamer to the narrow channels in the rivers when given the opportunity. Some of the cadets in fact become so skillful in steering that the captains of the boats insist on their presence at the wheel when the vessel passes through locks or narrow channels. This speaks exceedingly well for the naval reservists when it is considered that the slightest error on their part might prove disastrous, not only in beaching her but doing it in a place where all other boats might be blocked for an indefinite period and their precious cargoes shut off from their destinations. And yet this proficiency is acquired before the brief two months' training is completed.

The booklet containing the course of instruction issued to the reservists emphasizes the importance of concentrating attention on the note books. To quote from this booklet:

"You will study during the three-hour period every day, taking up the required subjects and reporting on them in detail in your note book, to the end that an inspection of your notes will be sufficient to give the person inspecting an understanding of the extent of your knowledge of the subjects reported upon; and in this connection you are instructed to make careful pen and ink sketches wherever possible, and are advised that the notes and sketches will have the greatest weight of all considerations leading to the selection of the men for the school at Pelham Bay, and you will be governed accordingly."



HARRY HARBOTTLE
Captain of the ore carrier D. G. KERR—He is representative of the lake captains who have never tired of helping naval reservists over the difficult parts of their training

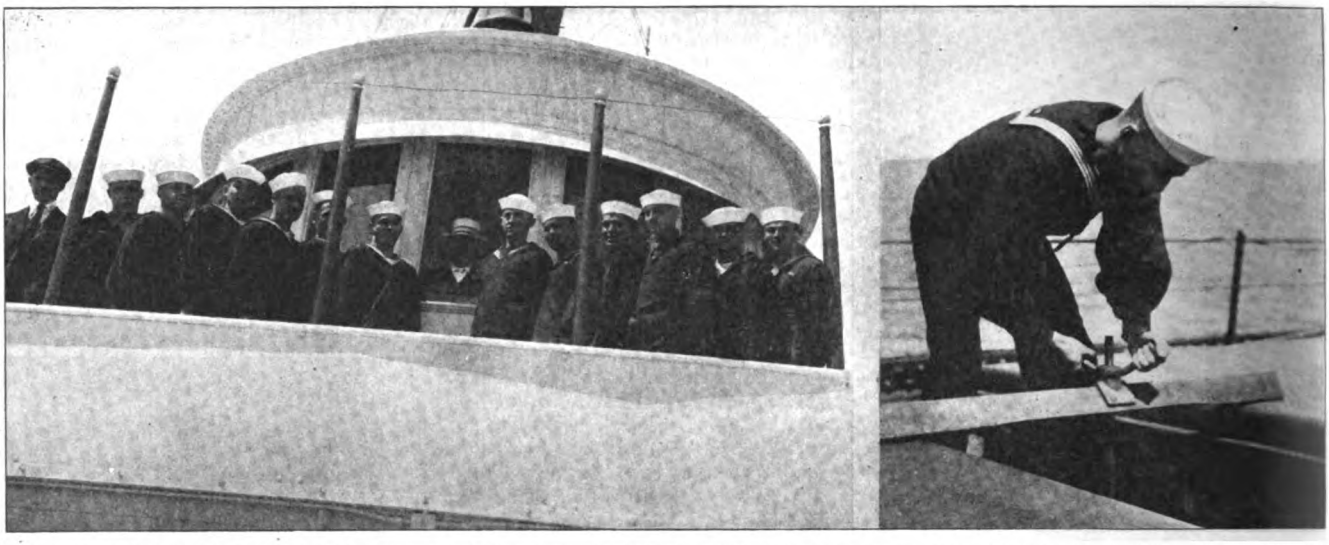
When They Study

The favorite study periods of the day are those from 9 o'clock till 12 o'clock in the morning and from 3 o'clock till 6 o'clock in the afternoon.

ENSIGN W. G. WOOD
To whom has been entrusted the responsibility of keeping track of the men assigned to the lakes.

With the importance of having a good note book impressed on their minds so thoroughly it is needless to state that the reservists not only take full advantage of the time allowed for study but they devote a considerable portion of their off watches, that is, their rest periods to them as well. The drawings in particular make huge inroads on their time, for while the booklet of instructions calls only for pen and ink sketches the training in mechanical drawing which most of the men have received in college makes them considerably more precise about their products than they would ordinarily be. Again many artists have been recruited in the ranks of the naval auxiliary reserve and naturally turn out such beautiful drawings and sketches that most of the other men strive to emulate them, fearing that their own handicraft will suffer by comparison. This is an entirely erroneous impression, for the drawings are graded on their practical merit and accuracy, not on their artistic value.

In the outline for note books reproduced on page 506 of this article, the first topic, "General Construction of the Ship," is probably the most important of the entire group. It enables the reservist to gain a basic idea of the



ON THE LEFT THE NAVAL RESERVISTS ABOARD THE STEAMER J. PIERPONT MORGAN. PREVIOUSLY TO THIS TIME THERE HAD NEVER BEEN MORE THAN FOUR MEN ASSIGNED TO ONE VESSEL. THE 14 MEN WERE PLACED ABOARD THE MORGAN AT THE PERSONAL REQUEST OF HER SKIPPER, CAPTAIN CONKEY, WHO DESIRED TO TEST THE PRACTICABILITY OF TRAINING LARGE GROUPS OF MEN AT A TIME. AT PRESENT ALL ORE CARRIERS ON THE LAKES EQUIPPED WITH PASSENGER QUARTERS ARE TRAINING AS MANY MEN AS THEY CAN HANDLE. AT THE RIGHT SECURING HATCH COVERS

construction of the entire vessel. To report on this subject thoroughly in his note book he must first explore every part, even the water bottoms to gain a comprehensive idea of the position and appearance of each individual feature mentioned in the outline. In reporting on these subjects in his note book he may use his books on seamanship for reference to secure additional details. It must be remembered that the ore carriers are built exclusively for service on the lakes, while the cadets are being trained for ocean-going vessels. Hence they have only their text books to refer to for ocean-going practice.

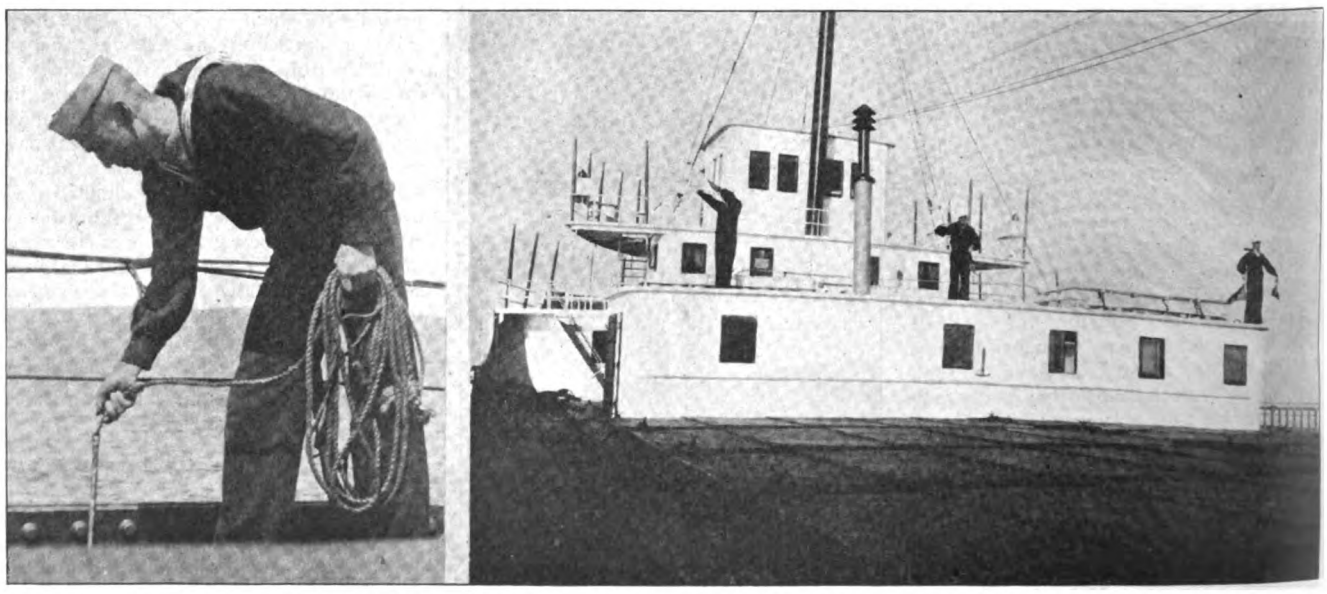
Marlinspike seamanship, the second subject, is comparatively simple, but the third subject "ground tackle, steering gear, deck fittings," is a lengthy and difficult one to complete for most students. The subjects "Bridges and Navigation Appliances," and "Mooring" likewise require especially large development.

Excellent Quarters on Lake Ships

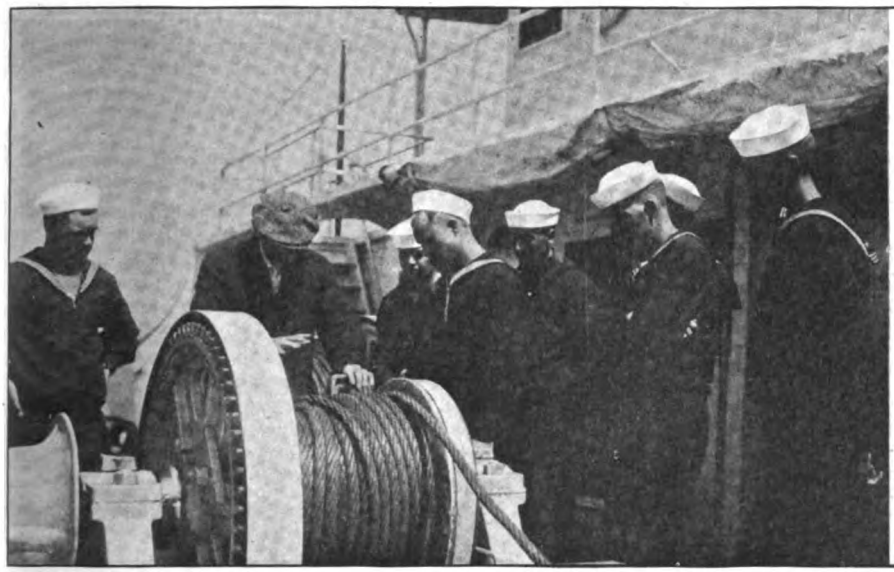
From the seafaring tales which they had read, in addition to their personal impressions of a sailor's life, it was generally understood by the men who first took the course this year that considerable hardship would accompany the two months' training on the lakes. While the training was anticipated as a novel and consequently pleasant experience, few men were familiar with ore carriers, and consequently believed that they would be forced to share watever poor accommodations befell the rest of the crew. Imagine their surprise when upon boarding their assigned vessels they found everything to be as modern and convenient as twentieth century development could make it—the quarters of the crew to be as well ventilated and well illuminated spaces as the cabins furnished passengers on passenger boats.

The quarters furnished the reservists are rooms as large and comfortable as can be found for them. If guests' or owners' rooms are available these are generally turned over to the reservists, for captains are desirous of doing all in their power to help the men complete their prescribed course of study, and thus every convenience is placed in their way. On many boats, of course, there are no such quarters to be had, in which case the men were placed in the crews' quarters, which were roomy and comfortable.

As for the food, it is the best which can be prepared and was an additional surprise to the men who had expected that some new and unfamiliar diet would be placed before



AT THE LEFT A RESERVIST SOUNDING THE TANKS. AT THE RIGHT THREE MEN SENDING SEMAPHORE SIGNALS FROM THE TOP OF THE MESS HOUSE. THEY ARE SIGNALLING TO THREE OTHER MEN ON THE BOAT DECK IN THE STERN OF THE VESSEL.



THE CAPTAIN INSTRUCTING THE MEN IN THE OPERATION OF A WINCH—AT THE RIGHT TWO MEN ARE "TAKING THE LOG."

them with which they would have to become accustomed as one disagreeable feature of their advent into a "salty" career.

They found that the food given the men on board the ore carriers is considerably better than most people, unfamiliar with steamship life on the lakes, realize. It is plain and wholesome, but is abundant and well prepared as the steamship lines endeavor to sedure the best possible cooks in order to keep their crews healthy and contented. The food is now prepared to meet the regulations of the food administration, but even in its present form, it is equal in quality and superior in quantity to that served by any of the restaurants on shore.

The reservists eat at the same mess provided for the regular petty officers of the ship, that is the wheelsmen, watchmen, oilers and watertenders. They partake of the same class of food and in all ways are subject to the same regulation sas those binding the crew.

Comfortable quarters, private baths and good food are moreover not the main consideration with the men. These are naturally greatly appreciated, but what the reservists are even more grateful for is a good place to do their work. Most of them realize before they ever board the ore carriers just how hard they must apply themselves if they are to be rewarded by the goal of their ambitions, and it is to that end that they set themselves for the comparatively brief period which they remain on the lakes.

* * * *

How the Captain Helps

The writer was fortunate enough to take a 5-day trip aboard one of the largest boats in the fleet of the Pittsburgh Steamship Co. during the past summer. Four jackies were aboard her and a harder working group was not to be found anywhere on the lakes. They had been on the boat six weeks and had applied themselves relentlessly to their note books, drawings and text books from the day which they first boarded her. All had practically completed the prescribed course of study and the note books themselves were works of art in their beautiful drawings and well balanced makeup. The men were then confining the greater portion of their time to pilot rules and signals in preparation for the examinations to be held in these subjects at Cleveland.

All four extended the entire credit for their unusually successful results to the captain, whose keen interest in their work was apparent in every task which they undertook. He not only made countless suggestions, the value of which could not be overestimated by the cadets due to the fact that he had sailed the lakes for over 30 years, but he kept a constant check on their work, subjecting their note books to rigid inspections at periodic intervals and constantly putting them through quizzes on subjects which they were likely to encounter in their examinations.

The captain's enthusiasm was so genuine and his pleasure so great when the cadets performed anything of unusual merit that the latter worked like Trojans to prove to him that his interest was not misplaced.

A Suggestion That Was Adopted

It was after these same cadets had been aboard their boat for approximately two weeks that one of them made a suggestion which the captain considered gravely for a day or two before deciding to follow up. This was nothing more nor less than to have a systematic observance of colors every morning and every eve-

THE OFFICERS OF THE MORGAN—IN THE CENTER, CAPT. C. M. CONKEY, AT THE LEFT, FIRST MATE FRANK DAVENPORT, AT HIS RIGHT, SECOND MATE C. J. BRINKER

Copyright by International Film Service

FINDING THE RANGE

ning such as is held on boats of the United States navy. Due to the fact that the crews on the ore boats work on the "watch on watch" principle, changing watches at 6 o'clock and at 12 o'clock, it was impossible for the colors to be observed at the standard time set for that purpose, namely, 8 o'clock in the morning and evening, but it was the captain's firm conviction that the time of observance would mean little as long as the spirit of the ceremony was felt by the individual members of the crew.

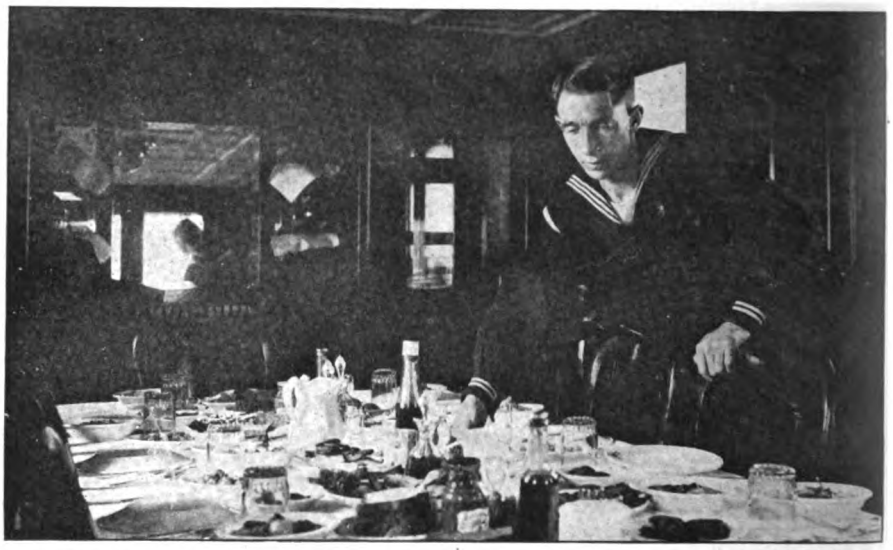
Accordingly, colors are religiously observed aboard that boat at 6 o'clock, morning and evening. The color guard consists of the four cadets and colors are sounded on the bugle by the second mate. The entire crew, save those members who must stay on duty, such as the wheelsman and the engineers, comes out on deck about five minutes before the time set for the observance. At the first note of the bugle, each man comes to attention bringing his arm up in a stiff right hand salute, keeping it there until the last note of the call has died away. The illustrations on page 511 show the colors being raised by the cadets, with the crew at attention.

* * * *

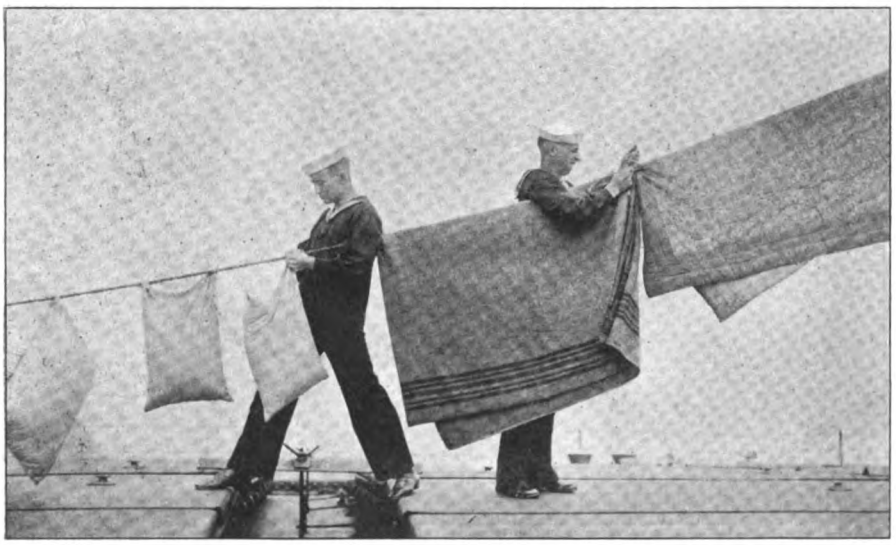
"Can the men splice a hawser?" I inquired of the captain.

"Can they?" The captain beamed at me good naturedly in apparent anticipation of some great news with which he would soon familiarize me. "They ought to be able to. They were taught by the 'saltiest tar' on the Great Lakes. But wait, you shall see for yourself. We must put an eye splice and thimble in a new mooring hawser which we just got aboard. I'll get 'Pete' and the jacks right at it."

Pete soon appeared on the scene in response to the master's command and upon being formally presented to me made such a profound impression that I took his picture. It is reproduced elsewhere in this article. Under his skillful supervision the jackies made short work of the cumbersome splice, once they had tackled it and the finished product settled all doubts in my mind as to their ability to splice.



THE "GALLEY SLAVE"—THE RESERVISTS ABOARD THE MORGAN TAKING TURNS EACH DAY IN WAITING ON THE TABLE AT MESS.

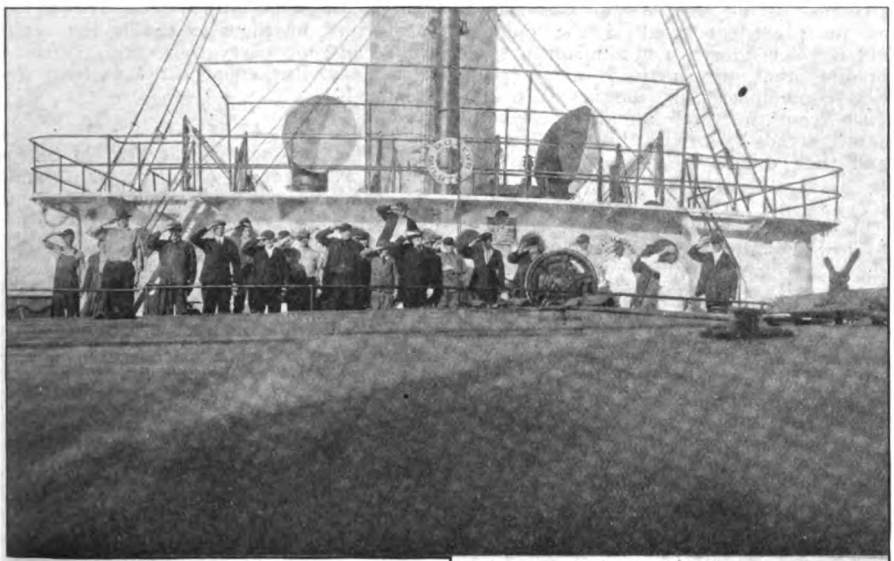


AIRING THE BEDDING—ONE DAY EACH WEEK IS SET APART FOR THIS WORK.

The enthusiasm of this group of reservists and, in fact, of every group of reservists on the ore carriers of the Great Lakes, has already left its stamp on the regular crews of the vessels. Enthusiasm is infectious and it is small wonder that many members of the crews became fired with an ambition to fit themselves for some service to Uncle Sam in his big new, ocean-going merchant marine. Accordingly, wheelsmen began to study signals to fit themselves to be quartermasters, boatswains to gain a better knowledge of the duties of salt water boatswains, and deckhands to gain a better idea of practical seamanship. At the present time these men are volunteering in large numbers for

service on salt water. Although their absence will be felt keenly on the lakes, vessel owners are aiding these volunteers and are taking up the work of training new men. Even the captains and mates have profited by the presence of the naval reservists aboard their vessels, for to keep a check on the studies of the cadets it has been necessary for many of them not only to review their own navigation problems but in many cases to touch on new and unfamiliar territory.

Many of the large carriers were equipped to carry passengers, but with the passage of the seaman's act in 1916, this practice was forbidden. It was recently suggested that these large and commodious passenger quarters be thrown open to the reservists in order that additional men might be stationed on the lakes. The suggestion was considered a good one and to try it out 14 reservists in early July were placed aboard the steamer J. PIERPONT MORGAN under Capt. C. M. Conkey. The entire details of their training were likewise left to Capt. Conkey, who has been exceedingly successful in handling smaller groups of reservists.



Handling a Big Crew

Realizing that it would be rather a difficult matter to keep a close check on the cadets without systematizing their routine in some manner or other, the captain has arranged a daily program for each watch, in which periods of time are devoted to subjects in proportion to their value to the cadets.

The entire 14 men are accommodated in the passenger quarters and likewise eat in a group at the same mess. As with the smaller groups, they stand watch on watch, seven men for each period, the watches alternating each week.

The "forward" watch goes on duty at 6:15 a. m., its first duty being to "turn to" and clean up the quarters, shine brass and make everything ship shape. At approximately 8 o'clock in the morning the entire watch reports to the second mate in the pilot house and the remainder of the morning is spent in studying marlinspike seamanship, stearing, taking bearings and making observations.

At 12:15 p. m. the watch is changed, the forward going to mess, and the after, just reporting for duty, going immediately to the pilot house taking up the same subjects as those of the morning watch before them.

The forward watch reports again for duty at 6:15 p. m. and begins the evening program with an hour's workout in sending and receiving signals in the semaphore code. Following this comes an hour's workout in international Morse signaling and a drill on the compass. The remainder of the watch is spent in drill on pilot rules, drill on international flag signals, and note book work. Whenever either of the mates, or the captain, is able to spare the time the cadets receive lectures on navigation.

The after watch coming on duty at 12:15 a. m. follows essentially this same program.

This routine is, of course, subject to change at the captain's inclination. For instance, the drill on the compass would be omitted once the cadets had mastered it to a degree where they could read at a glance any point, quarter-point or half-point, and study of other requirements substituted.

The men automatically assume lookout positions when the boat enters or leaves port, reporting, as at sea, everything of interest. They alternate in taking the post of "officer of the deck," and in making their reports to him the lookouts must follow the navy parlance. For instance, the lookout seeing a sail reports, "Ship ahoy." "Where away," calls down the officer of the deck.

"Two points off the starboard bow, sir," the lookout responds.

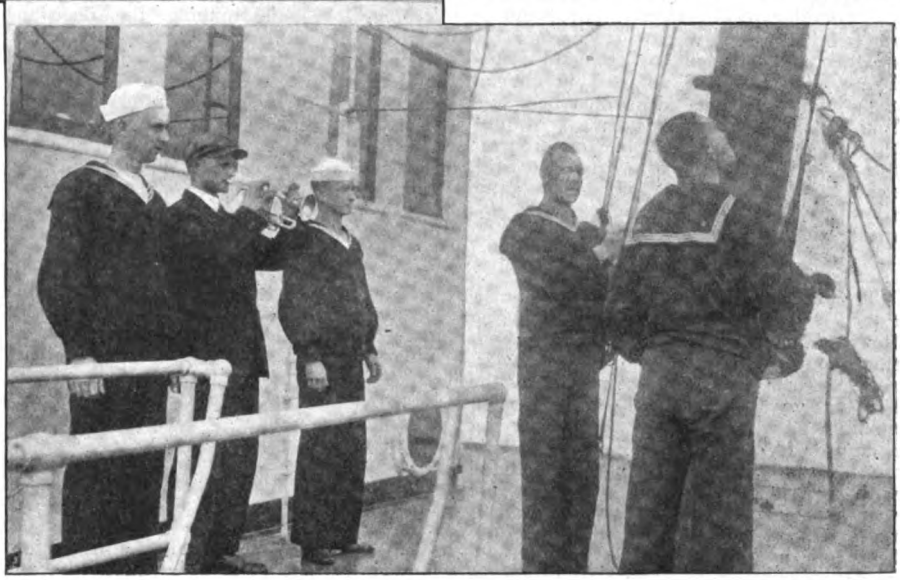
"Ship two points off the starboard bow, sir," reports the officer of the deck to the officer in charge of the bridge after he has first verified it himself.

* * * *

The men are left on the boats approximately two months before they are relieved by the next group of reservists, when they promptly return to Cleveland to be put through a series of examinations on seamanship, signaling and pilot rules. The examination in seamanship is given by Ensign Robert Wexler, who not only has gone through the entire preliminary training himself but who has long sailed on ore carriers and ocean vessels in the capacity of mate. He examines each cadet individually, asking numerous questions on all parts of the ship. In fact his versatility in asking questions of aspiring young reservists may be judged by one which he asked one cadet who came to him illy prepared. After subjecting him to the customary ordeal which the cadet underwent with rather shady success, the instructor finally shot at him, "What scale do you use to weigh anchor with?"

The cadet eyed him askance for a moment or two and then responded, "C sharp."

(*Concluded in Next Issue*)



SNAPPED JUST BEFORE THE COLORS WERE LOWERED ABOARD THE D. G. KERR. ABOVE IS SHOWN THE OBSERVANCE BY THE CREW.

Late Decisions in Maritime Law

Legal Tips For Ship Owners and Officers

Specially Compiled for The Marine Review

By Harry Bowne Skillman

Attorney at Law

THE question of the validity of rules and regulations of harbor commissioners of a particular port was considered in the case of BARGE No. 4, reported in 248 *Federal Reporter* 823. The commissioners of the port of Norfolk, Va., Portsmouth and Norfolk county, promulgated a regulation providing that no tows exceeding 700 feet in length shall enter or depart from the harbor. The court held the regulation to be valid and enforceable in the courts of admiralty, as well as in the state courts, and said: "Certainly, so far as the same is in furtherance of the purposes of commerce, it should be observed, respected, and enforced by the courts of admiralty."

* * *

The words "working days," it was said in Mikkelsen v Cargo of Sugar, reported in 248 *Federal Reporter* 807, "have an established meaning in construing charter party contracts. This found meaning is that 'working days' are calendar days, exclusive of Sundays and holidays, without reference to weather or other excusing conditions." The word "default," as used in charter party contracts, was also construed, and held not to convey the idea of "fault," but the idea of mere failure to perform; the lack of performance, it was said, exists without regard to how it came about, subject of course, to the *vis major* doctrine.

* * *

The vessel FLORENCE H. was requisitioned by the United States Shipping Board Emergency Fleet Corp. for national purposes connected with the war, and was subsequently chartered to the French government, the vessel being manned by a French crew and carrying a cargo of food for the French government. On its return trip, it collided with a British vessel, and libel *in rem* was filed. The court, whose opinion is reported in 248 *Federal Reporter* 1012, held that under the shipping act, which made vessels, while employed solely as merchant vessels, subject to the laws, regulations, and liabilities governing merchant vessels, the FLORENCE H. was subject to the libel, despite the rule that the act of a sovereign cannot be illegal within its own borders.

* * *

The seamen's act of March 4, 1915, providing for payment at intermediate ports of one-half part of the wages which seamen shall then have earned, was considered in the case of THOR, 248 *Federal Reporter* 942, and in the case of TALUS, 248 *Federal Reporter* 670. Both cases held that a seaman is entitled to be paid one-half of the wages he has earned, and that against such one-half there must be charged all prior payments he has received. This construction of the seamen's act was founded on precedent cited in the opinion, but the decisions are not uniform, some holding that the method of computation contemplated by the act is to deduct from the total amount earned the sum already received by the seaman and then divide the remainder by two.

* * *

A gasoline power boat, by engaging to tow a scow over a bar upon which the water was of sufficient depth at the proper state of the tide, assumes the ordinary obligation of a towing vessel; *inter alia*, to know the recognized channel, the tides, the draft of the tow, and with resonable skill to judge the weather; and where, while in her care, the scow pounded and stranded, either because her draft was too great for the bar, or the swell was such that even at highest tide she pounded when in the trough, the power boat was liable. The court in the case of White vs. Upper Hudson Stone Co., 248 *Federal Reporter* 893, in making the decision, said: "If the water was insufficient when calm, her master inexcusably misjudged the tide; if the swell was such as to let the scow pound, he ought to have perceived that such would be the case, for it was daylight and fine weather, and there was no necessity of going over the bar on that particular tide. What was done was negligence under any state of facts suggested."

* * *

"The war between this country and Germany did not prevent, nor materially affect the transportation of nitrates. There was no unusual or special danger to shipments between Chile and the United States, the line of travel not being in the danger zone." Resting its holding on these facts, the court in the case of W. R. Grace & Co., Inc. v. Luckenbach Steamship Co., Inc., 248 *Federal Reporter* 953, decided that the existence of a state of war did not operate to relieve a shipowner from fulfilment of a charter, by which it undertook to carry nitrates from Chile to the United States, under an article of a charter party reading: "The * * * enemies, pirates, * * * arrest and restraint of princes, rulers, and people, political disturbance or impediment, * * * always mutually excepted." The court said that even assuming nitrate to be contraband, the shipowner would not be relieved.

* * *

Where owners had chartered a vessel to independent shippers for a monthly payment, the cost of operation (except wages, etc. of the crew), the expense of loading, etc., to be paid by the charterers, the owners are not responsible, except for negligent acts of the master or crew of the vessel in navigating the vessel, or some duty necessary to be performed by them to enable the vessel to receive or carry her cargo safely.—Frazier v. Luckenbach, 284 *Federal Reporter* 1011.

* * *

The Harter act, it was held in SANTA ROSA, 249 *Federal Reporter* 160, should be enforced in such spirit and with such liberality as will effect its purpose—encouragement of shipbuilding and the employment of ships in commerce. "But such liberality of enforcement," the court said, "should not be carried to an extent that will deprive cargo owners and passengers of that degree of care on the part of those owning and operating ships which their safety demands and to which they are entitled."

* * *

Corrado v. Pederson, 249 *Federal Reporter* 165, holds that under the seamen's act of March 4, 1915, the first officer of a vessel is not to be regarded as a fellow servant of an ordinary seaman, but is agent of the owner, in so far as the security of the vessel's gear is concerned. It was then held that the vessel owner was liable, where gear gave way, either as the result of the owner's failure to furnish proper gear or failure of such first officer to replace the gear after it became unsafe by reason of exposure to the weather.

* * *

The general rule of admiralty law is that the share of a salving boat in salvage compensation belongs to the owner of the boat, for the obvious reason that ordinarily the boat is engaged in the dangerous service at risk of loss to her owner. But there is an exception to this rule, which is that the boat's share of salvage is awarded the charterer if the salving boat is at the time under a charter that amounts to a demise of the boat, or, if the charter party so expressly provides. The mere fact of ownership, without regard to where the risk lay and where the loss would fall, is not enough to determine where the reward should go. The boat's share belongs to the one who must bear the loss if the boat is destroyed, whether it be a general owner or a temporary owner under legal liability to make good its loss to the general owner. When a boat having two owners with different interests is put into salvage service and is subjected to the hazard of loss, the one question which determines the right to salvage is—Which owner would have sustained the loss if the boat had been destroyed in the service? For answer to this question it is necessary to go to the charter and examine its terms, both express and implied.—The Johnson Lighterage Co., No. 24, 248 *Federal Reporter* 74.

Official Report on Marine Engine Production from The Emergency Fleet Corporation

Wooden Ships

For single screw, Ferris type ships, 1400 horsepower triple expansion marine engines are employed. The dimensions are:

Cylinders 19 x 32 x 56

Stroke 36

Production to Sept. 21: 268.

For twin screw, Hough type ships, two 700 horsepower triple expansion marine engines are employed. The dimensions are:

Cylinders 15½ x 26 x 44

Stroke 26

Production to Sept. 21: 87.

Contractors for 1400-Horsepower Engines

Badenhausen Co.
Buckeye Engine Co.
Clark Brothers Co.
Filer & Stowell.
Fitchburg Steam Engine Co.
Hendricks Mfg. Co.
Hooven, Owens & Rentschler.
Llewellyn Iron Works.
Marietta Mfg. Co.
Norberg Mfg. Co.
Prescott Co.
Puget Sound Machinery Depot.
Traylor Engineering & Mfg. Co.
Union Machine Co.
Worthington Pump & Machinery Co.

Contractors for 700-Horsepower Engines

Buckeye Engine Co.
Builders Iron Foundry.
E. J. Codd Co.
Chuse Engineering & Mfg. Co.
Dodge Mfg. Co.
Sumner Iron Works.
General Ordnance Co.
Hendricks Mfg. Co.
Hewes & Phillips.
Murray Iron Works.
Main Iron Works.

Steel Ships

Steel ships of smaller sizes use two types of engines:

1400-horsepower engines as described under wooden ships.

1600-horsepower triple expansion engines, the dimensions of which are:

Cylinders 22 x 37½ x 60

Stroke 42

Production to Sept. 14: 13.

Large ships will use: 2800 horsepower triple expansion engines, the dimensions of which are:

Cylinders 24½ x 41½ x 72

Stroke 48

Production to Sept. 30: Four.

Contractors for 1600-Horsepower Engines

Ellicott Machine Corp.
Erie City Iron Works.

Contractors for 2800-horsepower Engines

Hooven, Owens & Rentschler.
Llewellyn Iron Works.
O'Neil Iron Works.
Badenhausen Co.
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

Note: In the majority of cases steel ships are fitted with turbines.

Concrete Ships

Small concrete ships use the 1400-horsepower engines described under wooden ships.

Large concrete ships use the 2800-horsepower engines described under steel ships.

Special Engines

450-horsepower compound marine engines for harbor tugs have these dimensions:

Cylinders 18 x 38

Stroke 26

850-horsepower triple expansion engines for seagoing tugs have these dimensions:

Cylinders 17 x 25 x 43

Stroke 30

Development of Equipment Machinery

While certain standard devices in mechanical equipment have been adapted to meet special requirements, no remarkable development in this line has occurred.

Diesel Engines

A number of diesel engines have been contracted for but none has been produced to date. Type of vessel not designated.

750 brake horsepower diesel oil engines: Contractor, McIntosh & Seymour.

825 brake horsepower diesel oil engines: Contractor Skandia Pacific Engine Co.

Ship Emergency is Past

Charles M. Schwab, director general, Emergency Fleet corporation, asserts that by next spring the United States will be placing new merchant tonnage in service at the rate of 700,000 deadweight tons a month. This statement was made at the banquet of the annual convention of the American Foundrymen's association in Milwaukee, Oct. 10. Mr. Schwab also estimates that during October 400,000 tons of ships will be placed in service. This does not mean merely ships launched but ships equipped with engines and ready for use.

Soo Canal Report

Commerce carried through the Soo canal in September aggregated 12,400,073 net tons. This is a drop of 1,144,613 tons from the shipments of September, 1917, which totaled 13,544,686 tons. The September figures show a decrease also when compared with those of August of this year. The August shipments amounted to 12,789,801 tons, or 389,728 tons more than those of September. Despite the fact that the freight movement for August, 1918, fell below that of previous months of this year and also below that of August of last year, on Sept. 1 the total movement for the season still exceeded the 1917 shipments for the same period. The two successive slumps, however, have dragged this year's total down so that on Oct. 1 the 1918 figures were smaller by 652,415 tons than those of last year.

EAST BOUND.	To Oct. 1, 1917.	To Oct. 1, 1918.
Lumber, M. ft. B. M.	268,615	233,044
Flour, barrels	5,070,909	5,507,564
Wheat, bushels	94,767,506	18,702,535
Grain, bushels	49,167,309	15,667,556
Copper, net tons	87,325	64,466
Iron ore, net tons	44,775,328	47,485,028
Pig iron, net tons	5,724	.....
Stone, net tons	.....	10,982
General merchandise, net tons	178,946	47,821
Passengers, number	18,394	17,008
WEST BOUND.		
Coal, soft, net tons	10,768,534	11,050,862
Coal, hard, net tons	1,820,609	1,262,221
Iron ore, net tons	57,647	105,138
Manufactured iron and steel, net tons	75,822	33,452
Salt, net tons	63,074	65,745
Oil, net tons	.....	239,317
Stone, net tons	.....	335,842
General merchandise, net tons	889,984	287,203
Passengers, number	19,085	17,430
SUMMARY.		
Vessel passages, number	16,386	15,229
Registered tonnage, net	46,742,398	45,830,561
Freight—		
Eastbound, net tons	49,778,016	49,420,991
Westbound, net tons	13,675,170	13,379,780
Total freight, net tons	63,453,186	62,800,771

Iron ore shipments for the season

continue to run ahead of those of last year, although the September shipments, taken by themselves, are smaller than those of last September. In September, 1917, 9,298,811 tons of ore were shipped down through the Soo, while this September saw only 8,750,841 tons pass down to lower lake ports. The season's shipments, however, are 47,485,028 tons as compared with last season's 44,775,328 tons. Grain and flour shipments still continue to fall far below the phenomenal shipments of last year and are even smaller than those of 1916 and 1915.

Capt. Dennis Sullivan, 1849-1918

Capt. Dennis Sullivan died in his Chicago home, Oct. 1, after a long illness. His health had been seriously impaired for the last year, during which time he was compelled to abandon business almost entirely. Captain Sullivan was a vessel owner and broker and a prominent figure in Great Lakes' shipping circles where he had a host of friends.

He was born in Dublin, Ireland, in 1849. When a small boy, his parents settled in Dunnville, Ont., and at a time when most boys are going to school, Captain Sullivan began his sailing career in small vessels on the Welland canal.

His advance was rapid and when a young man he was master of several well-known sailing vessels of that time. The schooner MOONLIGHT was the last sailing vessel he commanded. He built the steamer VERONICA in 1886 at Milwaukee and sailed her for two seasons. In 1889 he was made wrecking master for David Vance & Co., insurance agents of Milwaukee. He lived in that city for a number of years and in 1893 he went to Chicago to become a member of the firm of J. G. Keith & Co., vessel brokers. He organized the firm of D. Sullivan & Co. in 1900, and was agent for a large number of Lake Michigan traders.

Captain Sullivan was active in marine circles. He was a leading member of the Lake Carriers' association from the time it was organized and was a member of the board of directors and executive committee. He was also a member of the advisory committee of the Great Lakes Protective association. He was manager of the Chicago Navigation Co., Christopher Steamship Co. and the Gartland Steamship Co.

He is survived by his widow, five sons and one daughter: Frank J. Sullivan, Cleveland; Ralph Sullivan, Arthur C. Sullivan, Harry Sullivan, Paul D. Sullivan, and Helen Sullivan, all of Chicago.

Two of the Sullivan boys are in active service. Ralph Sullivan is a lieutenant colonel in service in France, while Paul D. Sullivan is an ensign on the torpedo boat destroyer MONTGOMERY.

The funeral was held from the residence, 5716 Sheridan road, Chicago, on Oct. 3. Among the pall bearers were many well known Great Lakes men. The honorary pall bearers were: William Livingstone, George A. Marr, Harry Coulby, J. S. Ashley, G. A. Tomlinson, C. D. Dyer, Capt. C. L. Hutchinson, W. H. Becker, Capt. H. L. Shaw, Robert J. Dunham, D. T. Helm, G. L. McCurdy, E. A. Uhrig, Peter Reiss, Capt. W. C. Richardson and Harvey D. Goulder. The active pall bearers were: G. A. Aiken, Charles E. Paine, Frank W. Smith, F. H. White, B. J. Johnson and John Shannon.

CAPT. DENNIS SULLIVAN

September Ore Shipments

Ore shipments for September, 1918, show a decrease of 541,138 tons as compared with those of September, 1917. Last year's shipments for the month of September totaled 9,536,152 tons, while the 1918 figures are 8,995,014 tons. This is a decrease also as against the shipments for August, 1918, which in turn fell down when compared with the record shipments for the two months preceding. In spite of the slump of the last two months, the shipments for the season still exceed those for the same period last year. Shipments to Oct. 1, 1917, amounted to 46,059,706 tons, or 2,269,572 tons less than the 1918 shipments of 48,329,278 tons.

The following table shows the amount of ore shipped from upper lake ports and the total shipments from each port up to Oct. 1.

	September, 1918	To Oct. 1, 1918
Escanaba	1,025,741	5,037,222
Marquette	536,886	2,812,978
Ashland	1,096,686	5,679,195
Superior	1,978,984	11,176,917
Duluth	3,204,829	16,361,722
Two Harbors	1,151,888	7,261,244
Totals	8,995,014	48,329,278
1918 decrease	541,138	
1918 increase		2,269,572

Lake Erie Receipts

Out of a total of 8,995,014 tons shipped from upper lake ports in September, Lake Erie ports received 7,104,033 tons, as shown by figures compiled by THE MARINE REVIEW. The balance on dock on Oct. 1 was 8,931,454 tons against 7,727,036 tons in Oct. 1, 1917. The detailed receipts by ports follow:

Port.	Gross tons.
Buffalo and Port Colborne	1,384,590
Erie	267,910
Conneaut	983,357
Ashtabula	1,732,678
Fairport	249,693
Cleveland	1,441,609
Lorain	434,737
Huron	194,830
Toledo	368,834
Detroit	45,795
Total	7,104,033

Samuel P. Shane, 1857-1918

Samuel P. Shane, president of the Great Lakes Towing Co., died in Mt Sinai hospital, Cleveland, Sept. 24, at the age of 61, after a brief illness. Practically all his life was devoted to transportation problems and he was one of Cleveland's best known railroad men. Compelled to leave school at an early age he determined to make railroading his life's work and he entered the employ of the Panhandle railroad with the object of learning the business from the ground up. Later he became identified with the Erie railroad, serving in the capacity of traffic manager for years.

In 1909 he was appointed manager of the Gilchrist Transportation Co., Cleveland, and later, with the late Gen. George A. Garretson, he was made receiver of the company, which position he held until the company liquidated.

In 1914 Mr. Shane was elected president of the Great Lakes Towing Co. and during recent years he was active in working out transportation problems brought about in Great Lakes' shipping by the war.

The funeral was held from the Cleveland residence, 2484 Stratford road, on Sept. 26 and the interment was at Pittsburgh. Mr. Shane is survived by his widow, Mrs. Ada Kennedy Shane; a son, Maurice V. Shane; two daughters, Mrs. Sidney Young Ball and Mrs. Theodore Griffith Rockwell, both of Chicago; and a sister, Mrs. Alice Shane Burns of Pittsburgh.

SAMUEL P. SHANE

American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the Vessel Construction Field

What the Shipping Board Has Done

THE American merchant marine is today expanding more rapidly than that of any other nation. In August of this year the United States took rank as the leading shipbuilding nation in the world. It now has more shipyards, more shipways, more shipworkers, more ships under construction, and is building more ships every month than any other country, not excepting the United Kingdom, hitherto easily the first shipbuilding power. Prior to the war the United States stood a poor third among the shipbuildng nations.

Within the jurisdiction of the United States shipping board on Sept. 1, 1918, there were 2185 seagoing vessels, totaling 9,511,915 deadweight tons. Of these, 1294, totaling 6,596,405 deadweight tons, flew the American flag. Under charter to the shipping board and to American citizens there are 891 foreign vessels, totaling 2,915,510 deadweight tons. At the time the United States entered the war, the American merchant marine included approximately only 2,750,000 deadweight tons of seagoing vessels of over 1500 deadweight tons. The expansion of the fleet within the jurisdiction of the shipping board has come about for the most part during the past year. The fleet list on Sept. 1, 1918, is shown in Table I.

Since August, 1917, more seagoing tonnage has been launched from American shipyards than was ever launched before in a similar period anywhere. The total, as of Sept. 1, 574 vessels, of 3,017,238 deadweight tons, is nearly four times all the seagoing tonnage (of over 1500 deadweight tons) built in the United States in any four prewar years. The total launchings since the first of this year, 482 vessels, of 2,392,692 deadweight tons, are more than eight times the seagoing tonnage (of over 1500 deadweight tons) produced in this country in any prewar year.

In the four prewar years, 1913-1916, according to the bureau of navigation of the department of commerce, this country built 107 seagoing steam vessels of over 1500 deadweight tons, totaling 805,037 deadweight tons. The high mark of prewar production in the United States of seagoing vessels of over 1500 deadweight tons was reached in 1916, when there were built 38 vessels, of 285,555 deadweight tons.

The rapid progress American shipbuilding has made in the first year of the present shipping board is shown in Table VI.

More than 2,000,000 deadweight tons of new ships have been completed and delivered to the shipping board during the past year. The first delivery was made on Aug. 30, 1917, by the Toledo Shipbuilding Co., Toledo, O. The first million tons of completed ships were obtained in May and the second million in August. The deliveries to the shipping board in August broke all world's records in the production of ocean-going tonnage and established the United States as the leading shipbuilding nation of the world. They totaled 349,783 deadweight tons. Those from American shipyards to the shipping board in August totaled 324,180 deadweight tons, exceeding the previous world's record for any month, which had been made by British shipyards in May, 1918, by 28,669 deadweight tons. The deliveries to the shipping board by American shipyards from Aug. 30, 1917, to and including Aug. 31, 1918, totaled 327 seagoing vessels of 1,952,675 deadweight tons. Adding eight vessels of 66,357 deadweight tons delivered by Japanese ship yards, the grand total of deliveries to the shipping board up to Sept. 1, 1918, was 335 vessels of 2,019,032 deadweight tons.

The monthly progress is shown in Table IV.

The deliveries to the shipping board from American shipyards in 1918 to Sept. 1 in comparison with the output for the same period by British shipyards is shown in Table III.

The most spectacular achievement in the history of shipbuilding, in this or any other country, was the launching from American shipyards on July 4 of 95 steel, wood, and composite vessels, totaling 474,464 deadweight tons. Thus in one day there were launched 188,909 more deadweight tons than was the output of seagoing tonnage (of over 1500 deadweight tons) in the best prewar year of American shipbuilding.

Another world's record was made by American shipyards for the month of July. There were launched in that month 126 steel, wood, and composite vessels, totaling 634,411 deadweight tons. This total more than doubles the launching totals for any month in the history of British shipyards. Prior to this year British shipyards launched more vessels annually than all the others in the world.

Thus an unprecedented pace of construction marks the rapidly increasing output of tonnage from American shipyards. All records for fast shipbuilding are now held by them. Before the war from nine months to a year were required to build a 3500-ton steel seagoing vessel, from a year to a year and a half to build a 5500-ton steel vessel, and from a year and a half to two years to complete a vessel of 8000 tons and over.

In July and August of this year only 34 calendar days elapsed between the keel laying and delivery of the 3500 deadweight ton steel freighter CRAWL KEYS. This world's record was made by the Great Lakes Engineering Works, Ecorse, Mich. The keel of the CRAWL KEYS was laid on July 11. The vessel was launched in the record-breaking time of 16 calendar and 14 working days. On Aug. 13 the CRAWL KEYS was completed, and on the following day it

Status of World's Tonnage Sept. 1, 1918

(Germany and Austria excluded)

	Deadweight tons
Total losses (Allied and neutral) August, 1914-Sept. 1, 1918	21,404,913
Total construction (Allied and neutral) August, 1914-Sept. 1, 1918	14,247,825
Total enemy tonnage captured (to end of 1917)	3,795,000
Excess of losses over gains	3,362,088
Estimated normal increase in world's tonnage if war had not occurred (based on rate of increase, 1905-1914)	14,700,000
Net deficit due to war	18,062,088

Allied monthly construction passed destruction for the first time in May of this year (1918). In August, deliveries to the Shipping Board and other seagoing construction in the United States for private parties passed Allied and neutral destruction for that month. The figures:

	Gross (actual) tons
Deliveries to the Shipping Board	244,121
Other construction over 1,000 gross	16,918
Total	261,039
Losses (Allied and neutral)	259,400
America alone surpassed losses for month by	1,630

Note.—World's merchant tonnage, as of June 30, 1914, totaled 49,089,552 gross tons, or, roughly, 73,634,328 deadweight tons. (Lloyd's Register.)

Table I.
Fleet Under Shipping Board Control September, 1918

	Number.	Dead-weight tons.
Requisitioned American merchant ships	449	2,900,525
Ex-German and ex-Austrian ships taken over by the United States Government	100	644,713
New ships owned by United States Shipping Board	256	1,465,963
Old Lake steamers transferred	31	117,800
American merchant ships not yet requisitioned (of over 1,500 dead-weight tons)	377	980,459
Dutch steamers requisitioned	81	486,945
Foreign ships chartered to United States Shipping Board	291	1,208,411
Foreign ships chartered to American citizens	600	1,707,099
Total	2,185	9,511,915

Table II.
Summary of the Shipping Board's Record

SYNOPSIS.

Shipyards for the construction of seagoing ships in the United States, January 1917, 61 shipyards (37 steel, 24 wood).

Shipyards and shipways in the United States September 1, 1918, 203 shipyards (77 steel, 117 wood, 2 composite, 7 concrete). These have 1,020 ways. Of 927 that are for the Emergency Fleet Corporation, 410 are steel, 400 wood, composite, and concrete, and 63 steel and 54 wood, composite, and concrete are under construction).

Seagoing ships of over 1,500 dead-weight tons each under American registry, January 1, 1917, approximately 2,750,000 dead-weight tons.

Seagoing ships of over 1,500 dead-weight tons each under American registry, September 1, 1918, 6,600,000 dead-weight tons.

Seagoing ships of over 2,500 dead-weight tons each built in United States yards for the Shipping Board from August 30, 1917, to August 31, inclusive, 1918, 1,952,675 dead-weight tons.

German and Austrian vessels commandeered, 644,713 dead-weight tons.

Seagoing vessels requisitioned and obtained by charter agreement with neutral nations, 1,695,536 dead-weight tons.

Ship workers employed in yards building for United States Shipping Board Emergency Fleet Corporation (Sept. 1), approximately 386,000. (In July, 1916, there were approximately 50,000.)

Employees in trades allied to shipbuilding on September 1, 1918, approximately 300,000.

United States Shipping Board program of construction, 2693 vessels, of 16,305,004 dead-weight tons.

Deliveries from American shipyards to the Shipping Board, this year, in comparison with the production of seagoing vessels of over 1,500 dead-weight tons in the United States (Bureau of Navigation figures) in the four years preceding the entrance of this country into the war were as follows:

	Dead-weight tons.
1918 (to Sept. 1, 277	1,636,852
1916, 38	285,555
1915, 19	169,540
1914, 19	159,588
1913, 31	190,354

*Best prewar year in the production of seagoing vessels of over 1,500 dead-weight tons in the United States.

Table III.
American and British Deliveries Compared

Month.	United States.	United Kingdom.
January	88,300	87,852
February	123,042	150,057
March	161,226	242,511
April	171,413	169,000
May	254,413	295,511
June	278,199	201,238
July	236,079	212,973
August	324,180	187,019
Total	1,636,852	1,546,161

To date American shipyards lead by 90,691 tons.

NOTE.—The foregoing table is in dead-weight tons. The deliveries to the Shipping Board do not embrace all construction in the United States. They deal only with seagoing vessels of over 2,500 dead-weight tons built under requisition or contract for the Shipping Board. The figures of production which properly correspond with those of the British Admiralty are compiled by the Bureau of Navigation, which, like the British, lists all vessels of over 100 gross tons.

was accepted by the shipping board and placed in commission.

Only 37 calendar days were required in May and June to build the TUCKAHOE, a steel collier of 5500 deadweight tons. This sensational pace for war-time shipbuilding was set by the New York Shipbuilding Co., Camden, N. J.

A world's record was made when the TUCKAHOE was launched 90 per cent complete on June 5 in 27 days, 2 hours and 50 minutes from keel laying. Another world's record was made 10 days later when the TUCKAHOE, ready for service, was delivered to the shipping board. The TUCKAHOE was carrying coal to New England on the fortieth day.

The 10 fastest built seagoing vessels in the world have come from American shipyards this year. They are:

CRAWL KEYS, freighter, 3500 deadweight tons, Great Lakes Engineering Works, Ecorse, Mich., 34 calendar days.

TUCKAHOE, collier, 5500 deadweight tons, New York Ship Building Co., Camden, N. J., 37 calendar days.

WEST LIANGA, freighter, 8543 deadweight tons, Skinner & Eddy Corp., Seattle, 78 calendar days.

WEST HOROKIE, freighter, 8800 deadweight tons, Skinner & Eddy Corp., Seattle, 79 calendar days.

WEST HOBOMAC, freighter, 8604 deadweight tons, Skinner & Eddy Corp., Seattle, 80 calendar days.

LAKE NARKA, freighter, 3530 deadweight tons, American Shipbuilding Co., Cleveland, 84 calendar days.

WEST COHAS, freighter, 8554 deadweight tons, Skinner & Eddy Corp., Seattle, 85 calendar days.

WEST GAMBO, freighter, 8554 deadweight tons, Skinner & Eddy Corp., Seattle, 86 calendar days.

WEST EKONK, freighter, 8554 deadweight tons, Skinner & Eddy Corp., Seattle, 88 calendar days.

WEST ALSEK, freighter, 8529 deadweight tons; WEST APAUM, freighter, 8516 deadweight tons; and WEST GOTOMSKA, freighter, 8586 deadweight tons, Skinner & Eddy Corp., Seattle; and LAKE GARDNER, freighter, 3300 deadweight tons, Great Lakes Engineering Works, Ecorse, Mich., 92 calendar days.

The speed that American shipbuilding has attained this year is further shown by the following launchings made in record time:

Manitowoc Shipbuilding Co., Manitowoc, Wis., launched the 3400-ton steel freighter CORSICANA on Aug. 7, 28 calendar days after keel laying.

Bethlehem Shipbuilding Corp., Alameda, Cal., launched the 12,000-ton freighter INVINCIBLE on Aug. 4, 31 calendar days after keel laying.

American Shipbuilding Co., Cleveland, launched the 3550-ton steel freighter LAKE NARKA on May 4, 46 calendar days after keel laying.

Baltimore Dry Dock & Shipbuilding Co., Baltimore, launched the 6450-ton steel refrigerator ship SOUTH POLE on June 17, 46 calendar days after keel laying.

Bethlehem Shipbuilding Corp., Alameda, Cal., launched the 12,000-ton steel freighter DEFIANCE on July 4, 46 calendar days from keel laying. On the same day this yard launched three other 12,000-ton steel freighters, one of them, the VICTORIOUS, 66 calendar days from keel laying.

When the present shipping board be-

gan its work, in August, 1917, there were only 61 shipyards in the United States. There were 37 steel shipyards with 162 ways. About three-quarters of their capacity had been pre-empted by the naval construction program, while private orders overflowed the remaining ways. In the 24 wood shipyards there were only 73 ways.

The largest shipyards in the world in October, 1918, are those of the United States. The Clyde river, in Scotland, historically famous as the greatest of all ship building localities, is already surpassed by two shipbuilding districts on the Atlantic coast and by two on the Pacific coast—by Delaware river and Newark bay in the East and by Oakland harbor and Puget sound in the west. One yard, Hog island, on the Delaware, is equipped to produce more tonnage annually than the prewar output of all the shipyards of the United Kingdom. It has 50 ways.

There are now 203 shipyards in the United States. The list comprises 77 steel, 117 wood, 2 composite, and 7 concrete shipyards. Of these, 155 are completed, 35 more than half completed, and only 13 less than half completed. The great plant at Hog island is 95 per cent completed—built in one year. Its site, when the United States entered the war, was a swampy marsh.

Every month of the past year has added to the number of American shipways, until today the impressive total is 1020—more than double the total of shipways in all the rest of the world. Of the 927 shipways that are for the Emergency Fleet corporation of the shipping board, 810 are listed today as completed, and only 117 are to be added. There are 410 completed ways for the construction of steel ships, 400 completed ways for the construction of wood, composite, and concrete ships.

The status of the shipyards plants is shown in Table V.

Employes

The records of the United States Shipping Board Emergency Fleet Corp. show that there are now approximately 386,000 employes in the shipyards. There were less than 50,000 shipworkers in July, 1916. The weekly pay roll of the shipyards building ships for the United States shipping board is $10,500,000.

Program and Contracts

Here is the program of ship construction which the shipping board has placed with the rapidly expanding shipyards of the country.

	Deadweight tons.
2249 contract ships, totaling	13,212,712
42 concrete ships, totaling	301,500
402 requisitioned ships, totaling	2,790,792
2693 ships	16,305,004

The shipping board has also contracted for the construction of 170 wood barges, 279 steel, wood, and concrete tugs, 100 trawlers, and 25 harbor oil barges, totaling 50,000 deadweight tons. To make clear the meaning of the different kinds of tonnage, these definitions are given. The term "gross tons" is held to express in units of 100 cubic feet the entire cubical capacity of the vessel including spaces occupied by cabins, engines, boilers and coal bunkers. The

Table IV.
Monthly Record of Deliveries

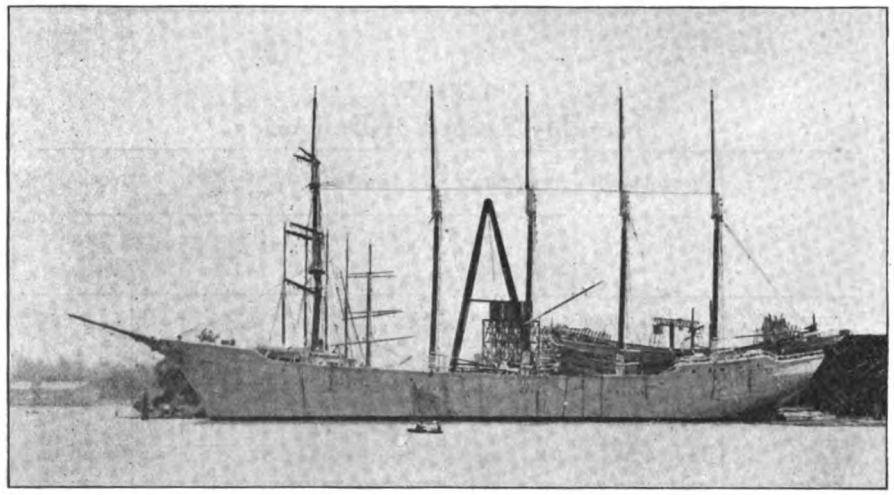
	Requisitioned.		Steel contract.		Wood contract.		Contract, built in Japan.		Total.	
	Number.	Deadweight tons.	Number.	Deadweight tons.	Number.	Deadweight tons.	Number.	Deadweight tons.	Number.	Deadweight tons.
August, 1917	1	2,930							1	2,930
September, 1917	7	47,029							7	47,029
October, 1917	13	87,858							13	87,758
November, 1917	18	78,805							18	78,805
December, 1917	11	99,301							11	99,301
January, 1918	10	79,729	1	8,571					11	88,300
February, 1918	15	114,520	1	8,521					16	123,042
March, 1918	19	152,678	1	8,548					20	161,226
April, 1918	30	162,842	1	8,571					31	171,413
May, 1918	36	214,508	6	36,405	1	3,500			43	254,413
June, 1918	35	198,230	9	61,969	5	18,000	2	15,837	51	294,036
July, 1918	19	109,006	18	109,073	5	18,000	3	24,917	45	260,996
August, 1918	24	139,248	19	106,402	22	78,000	3	25,603	68	349,783
Total	238	1,486,599	56	347,935	33	117,500	8	66,357	335	2,019,032

Table V.
American Shipyard Facilities on September 1

	Yards.					Status of completion.			Ways.				
											Completed.		Under construction or to be added.	
	Number.	For steel ships.	For wood ships.	For composite ships.	For concrete ships.	Shipyards practically completed.	50-100 per cent completed.	Less than 50 per cent completed.	Total number	For Emergency Fleet Corporation.	For steel ships.	For wood, composite, and concrete.	For steel.	For wood, composite, and concrete.
Districts:														
No. 1	19	4	15	0	0	13	3	3	90	64	18	33	0	13
No. 2	25	11	14	0	0	19	6	0	138	128	71	42	15	10
No. 3	21	7	14	0	0	15	6	0	75	62	27	32	3	0
No. 4	17	3	14	0	0	13	4	0	69	55	20	41	1	3
No. 5	15	5	9	1	0	11	3	1	53	53	6	35	8	4
No. 6	12	0	12	0	0	0	1	0	55	50	0	50	0	0
No. 7	17	10	7	0	0	14	2	1	94	80	43	25	12	0
No. 8	25	10	15	0	0	22	3	0	123	123	48	73	2	0
No. 9	21	16	5	0	0	19	2	0	112	110	84	14	12	0
No. 10	6	6	0	0	0	5	1	0	53	33	31	0	2	0
No. 11	13	0	12	1	0	12	1	0	57	57	0	54	0	3
Yards independent of districts	5	5	0	0	0	1	1	3	80	80	62	0	18	0
Steel yards, concrete plants	7	0	0	0	7	0	2	5	22	22	0	1	0	21
Total	203	77	117	2	7	155	35	13	1,020	927	410	400	63	54

Table VI.
Monthly Launchings from August, 1917, to August, 1918

Date.	Wood ships.		Composite ships.		Steel contract ships.		Requisitional steel ships.		Total.	
	Number.	Deadweight tons.	Number.	Deadweight tons.	Number.	Deadweight tons.	Number.	Deadweight tons.	Number.	Deadweight tons.
August, 1917							16	127,055	16	127,055
September, 1917							12	61,930	12	61,930
October, 1917							19	131,126	19	131,126
November, 1917					1	8,800	19	135,805	20	144,605
December, 1917	2	7,500			2	17,600	21	134,730	25	159,830
January, 1918					1	8,800	15	103,700	16	112,500
February, 1918	4	14,500	1	4,000	3	21,150	23	132,200	31	171,850
March, 1918	10	36,000	1	4,000	6	51,650	27	167,266	44	258,916
April, 1918	16	55,500	1	4,000	7	45,850	22	119,880	46	225,230
May, 1918	30	108,200	2	7,500	14	85,025	28	164,530	74	365,255
June, 1918	22	78,700	1	3,500	13	74,300	13	77,050	49	233,550
July, 1918	53	187,700	3	11,000	35	218,725	33	216,986	124	634,411
August, 1918	33	111,350	4	14,500	48	176,400	13	88,730	98	390,980
Total	170	599,450	13	48,500	130	708,300	261	1,660,988	574	3,017,238



AUXILIARY SCHOONERS RELEASE STEEL VESSELS FOR OVERSEAS COMMERCE

Craft of this kind are in demand at the present time as they take the place of steel vessels in trades where speed is not the prime factor. In this class of trade the auxiliary has proved its worth as it furnishes a cheap means of moving raw material. These vessels are handling nitrates, ores, cotton, coal and lumber. Twenty of these craft are now being built in Mississippi and Texas yards.

"net ton" is regarded as equaling 100 cubic feet of capacity, exclusive of deductions for space occupied by cabins, machinery, etc. "Deadweight tonnage" signifies the maximum weight of cargo, bunkers, consumable stores, and all other weight, including passengers and crew.

Table II gives a synopsis of what the shipping board has done in the last year.

Establishes Record

With the recent launching of the 4000-ton wooden steamer ABERDEEN, by the Grays Harbor Motorship Corp., Aberdeen, Wash., in 17½ working days from the date of laying the keel, the North Pacific wooden ship industry has established what is claimed as a new world's record for wooden ship construction. The vessel's keel was laid Sept. 9 and when the hull took the water, government inspectors pronounced the hull and superstructure 95.73 per cent complete and engine installation 40 per cent finished. The ABERDEEN is a Ward type of vessel, designed by M. R. Ward, manager of the yard, several others of which have been completed and delivered to the government by this plant. Mr. Ward laid a wager before the ABERDEEN'S keel was laid that he could launch her in 20 days and he beat his prediction by 2½ days. When it is considered that there are 1,962,000 feet of lumber in a Ward type of steamship and 133,000 feet of staging lumber used, it can be realized how perfect is the organization at this yard. The Ward type of steamship is 290 x 49 x 28.2 feet, twin screw with triple-expansion, inverted type engines. It is expected to deliver her in less than 30 working days and as the best previous time for a wooden vessel is 47 days, the Aberdeen yards has established a mark that other plants may have difficulty in bettering.

To Construct More Concrete Ships

The unqualified declaration that the United States shipping board is convinced of the practicability of concrete cargo carriers and proposes to build them upon a more extensive scale, was made at Atlantic City recently by H. J. Brunier, of San Francisco, supervisor of concrete ship construction for the Emergency Fleet corporation. Mr. Brunier said:

"Forty-two concrete ships provided for in our present program are only a beginning, for more are to be provided for as rapidly as practicable now that their practicability has been established to the complete satisfaction of the Emergency corporation.

"Experience has demonstrated that the concrete ship is not only lighter but costs less than wooden vessels. The FAITH, our first reinforced concrete craft, cost little more than $32 a ton deadweight, but her successors probably will cost as high as $50 a ton. Wooden ships today cost the government from $87 to $100 a ton deadweight and some much higher. Steel ships cost $125 a ton deadweight and upward. These figures are for hull alone.

"The time of construction is virtually the same for all. How long concrete ships will last is the only question that is now causing any worry for we know that a concrete vessel during the life now allotted is equally as strong as a steel ship."

In the construction of the new shipyard of the Halifax Shipyards, Ltd., Halifax, N. S., approximately 270,000 cubic yards of earth and rock will have to be removed. About 20,000 cubic yards of concrete is to be laid and the plans call for the employment of 3500 men.

Busy Times For North Pacific Yards

AS the climax to a splendid month of shipbuilding achievement in the Pacific northwest, the Seattle-North Pacific Shipbuilding Co. entered the list of delivering plants with the 9400-ton steel steamship OZETTE which went down the ways Sept. 28. This company is the latest addition to Seattle's steel plants and it expects to make a creditable record in delivering ten 9400-ton steel freighters for the United States government, the OZETTE being the first. Already four ways are in operation and fabrication work for hulls 5, 6 and 7 is under way. The vessels being built by this plant are the largest ordered by the government on Puget sound. J. E. Sheedy, for years with the Seattle Construction & Dry Dock Co., has just resigned as general manager of the Seattle-North Pacific, after having completed the preliminary organization work at this big yard. He has been succeeded by John D. Twohy, a member of the board of directors. Mr. Sheedy became general manager last April when the yard site was under water and his achievement in laying out the plant, building up the equipment and completing the organization has brought him much praise.

During September, the Skinner & Eddy Corp. celebrated a triple launching, on the same day sending into the water the 8800-ton steel steamers WEST CRESSY and WEST LOQUASSUCK as well as the harbor tug LITTLE DAVID. The latter is named after David Rodgers, general manager, and will be used in connection with work at this plant. This yard established another enviable record by delivering the steamer WEST HUMHAW in 65 working days, this being the second contract completed in this record breaking time.

The Elliott Bay Shipbuilding Co. launched its first vessel, TROLLTIND; during September. This yard has a contract for a number of wooden steamers, and several others are soon to be ready.

The first steamer built by the Patterson-McDonald yard, Seattle, BELLATA, has just had her trial trip and has been turned over to the Australian government. These vessels are of 4200 tons deadweight and are to be operated between Australia and the North Pacific.

With the delivery to the shipping board of the 8800-ton steel steamer WESTERN HOPE, J. F. Duthie & Co., Seattle, have completed and turned over to the government since Jan. 1, 11 vessels of this type, or a total of 96,800 tons. Extensive improvements are under way at this yard, including two new plate shops each 300 feet in length.

Among the vessels launched at North Pacific ports in September are the following:

Sept. 11—WAR NANOOSE, wooden steamer, at Victoria, B. C.

Sept. 12—WEST LASHAWAY, 8800-ton steel steamer by Skinner & Eddy Corp., Seattle.

Sept. 21—LITTLE DAVID, tug, launched by Skinner & Eddy Corp., Seattle.

Sept. 21—WEST CRESSY, 8800-ton steel steamer by Skinner & Eddy Corp., Seattle.

Sept. 21—WEST LOQUASSUCK, 8800-ton steel steamer by Skinner & Eddy Corp., Seattle.

Sept. 21—WESTPOOL, 8800-ton steel steamer by J. F. Duthie & Co., Seattle.

Sept. 18—WEST CAPE, 8800-ton steel steamer by Ames Shipbuilding & Dry Dock Co., Seattle.

Sept. 23—ALFALKEY, 3500-ton wooden steamer by Meacham & Babcock, Seattle.

Sept. 4—OLEANDER, 3250-ton wooden steamer by Anderson Shipbuilding Co., Seattle.

Sept. 21—TROLLTIND, 3000-ton wooden steamer by Elliott Bay Shipbuilding Co., Seattle.

Sept. 15—NANCY, 3000-ton wooden auxiliary steamer by The Foundation Co., Portland, Oreg.

Sept. 2—CADARETTE, 3500-ton steel steamer by Albina Engine & Machine Works, Portland.

Sept. 15—KOKOMA, 3500-ton wooden steamer by Grant Smith-Porter Shipbuilding Co., Porland, Oreg.

Sept. 24—J. N. GREENSHIELDS, 2500-ton wooden steamer by Lyall Shipyards, Vancouver, B. C.

Sept. 28—OZETTE, 9400-ton steel steamer by Seattle-North Pacific Shipbuilding Co., Seattle.

Sept. 28—ABERDEEN, 4000-ton wooden steamer by Grays Harbor Motorship Corp., Aberdeen, Wash.

Sept. 28—WAR NOBLE, 8800-ton steel steamship by Coughlan's Yards, Vancouver, B. C.

Sept. 28—WAR STORM, ——— steel steamship by Wallace Yards, Vancouver, B. C.

Latest News from American Shipyards

THE Elliot Bay Shipbuilding Co., Seattle, a comparatively new concern which was organized about a year ago, launched its first vessel recently, the TROLLTIND, a 3000-ton twin-screw wooden motorship. The vessel took the water in the time-honored manner with her bows dripping with champagne. She was built for the Anglo-Norwegian Shipping agency, New York. She will sail under American registry and will make her maiden voyage in the Pacific trade at charter rates which will net handsome returns. The vessel is 260 feet long over all, 46 feet beam and 26 feet deep. She will be equipped with diesel engines of 500 horsepower each, and is expected to log 10 knots an hour.

* * *

Capt. Harry Crosby, a well-known Seattle man, recently sold a tract of land comprising 1½ acres to the Ballard Marine railroad. The purchase price was $32,000 cash. The property sold has been held by the Ballard Marine railroad under lease and subject to the Ballard Shipbuilding Co. It is the site of this company's yards and contains two sets of ways, one of which is large enough for the construction of ocean carriers.

* * *

The Neches Shipbuilding Co., Beaumont, Tex., which has recently been incorporated with a capital stock of $1,000,000, has bought the old Piaggio shipbuilding yards and is assembling material and engaging workmen for the construction of a 3500-ton iron-strapped schooner barges for the Emergency Fleet corporation. The company plans to enlarge the present plant to build barges on a large scale. M. Guiterman is president, and J. J. Schultheiser, vice president and general manager.

* * *

The new wooden steamship ALAPATHA which was recently constructed by the Traylor Shipbuilding Co., Cornwells, Pa., has made a successful trial trip on the Delaware river. The new vessel is the second one of this type to be turned out by the Traylor company, which is a new concern.

* * *

John Wilson, veteran shipbuilder of Seattle, has purchased the plant of the National Steel Construction Co. on the Duwamish waterway from Albert Kelley. It is Mr. Wilson's intention to engage in building steel ships up to 300 feet in length and to manufacture crank shafts and other equipment. It is also planned to have the plant figure on a larger scale in the construction of steel tugs and other small craft. At present, the yard is building steel ocean-going tugs for the government.

* * *

Quantity production of ships is endangered through rulings of the priorities committee of the war industries board with respect to lumber, declared Robert Allen, secretary of the West Coast Lumbermen's association before the senate military affairs committee.

* * *

A site of land has been purchased at Orange, Tex., by the Gulf States Shipbuilding Co. The company intends to organize a large shipyard and states that it will construct concrete ships which are to be used in the coastwise trade between the United States and Mexican ports. The company is assembling material and hiring workmen for the new plant.

* * *

The first two keels for a total of 13 steel vessels to be built for the Emergency Fleet corporation have just been laid by the Fabricated Ship Corp., Milwaukee. The company has completed its new yard at the foot of Twelfth street on the Menomenee canal. The corporation is a consolidation of the Coddington and Newton engineering interests which have handled some of the largest steel and reinforced concrete construction jobs in the middle west in recent years. The 13 vessels to be built will consist of nine ships for mine planting, 172 feet long, and four river transports 130 feet long.

* * *

J. F. Duthie & Co., Seattle, have built 12 freighters of 8800 tons each for the Emergency Fleet corporation. If these vessels were placed end to end they would contribute one mile toward General Pershing's famous bridge of boats. The twelfth vessel to be launched by the company was the WESTPOOL, which is the last of the commandeered ships which have been building in the company's yards. The company is now working exclusively on direct-contract vessels.

* * *

The Elliott Bay Shipbuilding Co., Seattle, recently was awarded a contract for five wooden vessels by the United States shipping board, according to an announcement of E. L. Skeel, secretary of the company. The vessels will be 3500-ton cargo carriers. This is somewhat larger than the vessels heretofore built by the company, which were of 3000 tons.

* * *

The Skinner & Eddy Corp., Seattle, delivered the 8800-ton steamship WEST HUMHAW six months ahead of schedule time. This vessel, known as hull No. 30 in the company's yards, is a direct-contract vessel, launched in 51 days from the laying of the keel. When the contract for her construction was awarded, the corporation agreed to deliver the big craft completed and ready for sea on March 15, 1919.

* * *

L. N. Dantzler, president of the Dantzler Shipbuilding & Drydock Co., Moss Point, Miss., has informed the shipping board that his company will launch a ship every 30 days following the first of October. The weekly payroll of the Dantzler company is $25,000.

* * *

The France and Canada Steamship Corp. has started work on a yard for the construction of schooners, oil barges and small steamers, at Aransas Pass, Tex.

* * *

The Darien Shipbuilding Co., Darien, Ga., is at work on seven 2500-ton, 3-mast schooner barges for the Emergency Fleet corporation. The Darien yard is at the mouth of the Altamaha river.

* * *

The National Shipbuilding Co., Savannah, Ga., has completed 35 barges for the shipping board and has 10 more to build.

* * *

Fred T. Ley Construction Co. has a force of 500 men building a concrete shipbuilding plant at Mobile, Ala., where eventually 4500 workers will be employed.

* * *

The Durrance Shipbuilding Co. has been organized at Tarpon Springs, Fla., to build schooners and steamers of less than 1000 tons. John R. Durrance is president of the company.

* * *

The marine department of the Houston Bank & Trust Co., Houston, Tex., is building two concrete cargo ships of 1600 tons deadweight capacity for the Pan-American Trading Co., according to announcement by the bank. The yards of the Houston company are at Houston terminals, on the ship channel, 10 miles below the town of Houston, and consists of two end-launching and two side-launching ways. All machinery is operated by electricity. The concrete ships are to be driven by 500-horsepower diesel-type crude oil engines.

On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

Lake Vessel Sales and Launchings

BY M. L. SHANER

THE steamer GALE STAPLES went ashore at Point Au Sable, Lake Superior, on Monday, Sept. 30. The STAPLES was bound for Hancock, Mich., with a cargo of coal. The crew was forced to abandon the vessel as she was leaking badly. The sea was washing over her decks and she was pounding hard. She was later abandoned by the underwriters as a constructive total loss. The steamer, which was formerly the CALEDONIA, is owned by the Massey Steamship Co., of Superior, Wis.

* * *

The barges S. D. WARRINER and A. W. THOMPSON have been sold to the Clinchfield Navigation Co., New York. They will be cut in two at the Port Huron yards of the Foundation Co. in preparation for their trip to the coast. The former owner is the Calumet Transportation Co., Cleveland.

* * *

For the third consecutive month the ninth district of the Emergency Fleet corporation, which includes all lake yards, has delivered half or more than half of all the steel ships delivered in the United States during September. The ships built and delivered in the ninth district since its creation about a year ago would, if placed end to end, extend over 7 miles and far outstrips the remaining national production. The Emergency Fleet corporation reports show also that the tonnage production per man employed in the ninth district is greater than in any other, and that the output is about 70 per cent higher than the national average.

* * *

The eagerness with which the sailors on the lake fleet subscribed to the Fourth Liberty loan is evidenced by the total announced by the Lake Carriers' association at the end of the eleventh day of the drive. This total represents the pledges from 68 of the boats and amounts to $113,400. It is plain that neither their purchase of some $464,600 worth of bonds on the third loan, nor the German peace drive has dampened their bond-buying enthusiasm.

* * *

The first steel tug to be launched by the Northwest Engineering Works of Green Bay, Wis., was dropped from the ways there on Sept. 25. The vessel was christened LAKE COCHEO, the name selected by Mrs. Woodrow Wilson. The tug is destined for coastwise trade.

* * *

The Bassett Steamship Co., Toronto, has sold the steamer MARISKA to J. M. Stewart, of Toronto. The price was about $300,000. The steamer will be cut in two and fitted for salt water service at Buffalo and from there taken to the coast. The Bassett Steamship Co. purchased the MARISKA from the Pittsburgh Steamship Co. in 1914.

* * *

Capt. F. D. Selee was injured recently at Toledo by falling off a ladder. Captain Selee is master of the steamer PRINCETON of the Pittsburgh fleet. He took his steamer out after the accident but was forced to stop at Detroit where he was taken to a hospital. Capt. F. J. Crowley is in charge of the PRINCETON during his absence.

* * *

The steamer PAIPOONGE and the barge THUNDER BAY have been sold to Cuban sugar interests by the Montreal Transportation Co. The price was not made public. The boats, which will be taken to the coast this season, were turned over to the new owners immediately. They were formerly owned by the Pittsburgh Steamship Co. At that time the PAIPOONGE was known as the CORONA and the THUNDER BAY as the MALTA. The boats will have to be cut in two to enable them to pass through the Welland canal. The PAIPOONGE is 299 feet keel, 40 feet beam and 24 feet deep. The THUNDER BAY is 302 feet keel, 40 feet beam and 25 feet deep.

* * *

The barge GRAMPION, in tow of the tug HOWARD, took a sheer while entering the St. Clair river from Lake Huron on Oct. 3 and parted her tow line, colliding with the steamer R. P. FITZGERALD at the dock of the Northern Navigation Co. The FITZGERALD was damaged so seriously that she sank in 22 feet of water directly in front of the coal dock. Capt. T. Emig, owner of the FITZGERALD, considers her a total loss and will doubtless abandon her right where she now lies. The bow of the GRAMPION, which was slightly damaged, was patched temporarily and she proceeded down the river with her cargo of lumber.

* * *

The steamer AUSTRALIA, which was sunk in the St. Clair river in collision with the steamer B. F. JONES on June 15, completed repairs at the Cleveland yard of the American Shipbuilding Co. on Oct. 1. The steamer was out of commission more than three months.

* * *

The work of floating the steamer CHARLES S. PRICE, which turned turtle in Lake Huron in the big storm of November, 1913, is about to be started by the American Salvage Co., New York. G. W. Sissons will be in charge of the work. The steamer BROKATE of the United Fuel & Supply Co., Detroit, has been chartered by the wreckers and is being fitted up with air compressors and dynamos.

* * *

The barge MUSKOKA, owned by the Montreal Transportation Co., was abandoned in the middle of Lake Ontario about 15 miles off Ducks light on Monday, Sept. 30. All the members of the crew were saved. A tug, sent out from Kingston, Ont., to search for the vessel, picked her up on Wednesday and towed her to Sacketts Harbor.

* * *

Federal Manager H. S. Noble of the barge canal lines and Gen. W. W. Wotherspoon, state superintendent of the canal, with members of their staffs, left Buffalo on Sept. 30 in a power launch to make an inspection trip of the canal lines with a view to having some improvements made at once at various points. It is planned to have a considerable quantity of grain sent over the canal to seaboard this fall. Some of it has already been sent forward.

* * *

W. D. Becker, general manager of the Valley Steamship Co., and son of W. H. Becker, the well known vessel owner, has received a commission as second lieutenant in the liquid fire and gas service of the army. Lieut. Becker left for Washington on Oct. 10.

* * *

The American Shipbuilding Co. has launched three new steamers, building for the Emergency Fleet corporation, two of them in one day. Steamer No. 479 was dropped overboard at the Cleveland yard on September 14. On the same day the Detroit yard launched steamer No. 232, while a day later steamer No. 233 was dropped into the water at the Wyandotte yard. The new boats will be completed and ready to leave for the coast in about 30 days.

* * *

The steamer HELENA, bound from Cleveland to Toledo to load coal, went ashore at Little Chicken island, Lake Erie, on the night of Sept. 17. When she first went ashore she was afloat forward although she was out a foot aft. Her shoe was damaged and her rudder gone. A storm on Wednesday, Sept. 18, filled her with water and she settled on the bottom all around. The wrecker PHILETUS SAWYER was sent to

her aid, but because of unfavorable weather was unable to work on her for two or three days. At the end of that time she was so badly damaged that she was abandoned to the underwriters as a constructive total loss. The HELENA was owned by the Armour Grain Co., Chicago. She was insured for about $70,000. She was built in 1888 and is 275 feet keel, 42 feet beam and 20 feet deep. The underwriters have let the contract for releasing the steamer to Capt. C. E. Le Beau of the Citizens Sand & Gravel Co., Toledo.

* * *

The steamer CONNERSVILLE, built for the Emergency Fleet corporation, was launched at the Ashtabula yards of the Great Lakes Engineering Works on Sept. 14. Miss Ethelyn Sample, of Connersville, Ind., was sponsor for the freighter, and a delegation of 17 members of the Connersville chamber of commerce attended the launching. Mrs. Woodrow Wilson named the freighter for Connersville in recognition of the record made in Fayette county, of which Connersville is the county seat. This county was the first to "go over the top" in the sale of war savings stamps.

* * *

The steamer D. R. HANNA went ashore at Detour shoal, Lake Huron, on the morning of Sept. 12. She was consigned to Indiana Harbor, Ind., with a cargo of ore. The lighter NEWMAN was sent to her aid immediately and the lighter RELIANCE, which was working on the steamer LA SALLE, also aground, was sent on to the HANNA as soon as the LA SALLE was freed. The steamer was released on the morning of Sept. 16 after lightering part of her cargo. She proceeded to Indiana Harbor. After unloading the cargo she was taken to Ecorse, Mich., to the yard of the Great Lakes Engineering Works where she was placed in dry-dock. She has between 50 and 60 damaged plates, her tail shaft is cracked and repairs will have to be made to her stern post and rudder stock.

Along the Atlantic and Gulf Coasts

FREIGHT handlers employed at Boston by the Merchants & Miners Transportation Co. and the Metropolitan line caused considerable delay to shipping recently by striking to enforce a demand for 50 cents per hour, 75 cents for overtime and $1 for Sundays and holidays. The men accepted the compromise wage of 48 cents per hour, 70 cents overtime and 90 cents for Sundays and holidays although, in the case of the first-named company, the strikers held out some little time in an effort to have their pay on a weekly basis.

* * *

The big sea tug GYPSUM PRINCE, engaged in barge towing, was commandeered while at Boston and will be placed in foreign service.

* * *

The steam trawler KINGFISHER, Capt. J. B. O'Reilley, owned by the East Coast Fisheries Co. and operating out of Boston and Gloucester, has been destroyed by a submarine off the coast of Nova Scotia. The company has two more trawlers building at Portland, Me. The KINGFISHER was valued at $175,000 and insured for $250,000.

* * *

Settlement out of court has been made in case of the claim of the United Fruit Co. against the Spanish steamship MAR ROJO which the company's ship picked up 500 miles east of Nantucket last summer and towed to Boston. The MAR ROJO received a new tail shaft and propeller at Boston.

* * *

Maj. John Quinn, one of Boston's best known stevedores, recently discharged 172,000 tons of freight at a French port in one month. This information was received by letter from overseas.

* * *

Several 4-mast schooners for Boston are building at the Thomaston, Me., yard of the Atlantic Coast Co. The first to be launched, in December, is the IDA S. DOW.

* * *

The 4-mast schooner GOVERNOR POWERS, owned by the Crowell & Thurlow Steamship Co., Boston, has been sunk in Nantucket sound in collision with a steamship. Capt. W. K. Anderson, his wife, and crew, were saved. The vessel, bound from Portland, Me., for Norfolk, Va., in ballast, is likely to prove a total loss.

* * *

The largest shipment of Cuban sugar received at Boston this season totaled 12,480,000 pounds.

* * *

A former German bark recently arrived as a 5-mast topsail schooner from Adelaide, Australia. The freight approximated $75,000 or enough to pay for rerigging the vessel which had been dismasted and towed to an Australian port.

* * *

The Boston sailing ship AVON is overdue on a passage from New York for the River Plate and grave apprehension for safety of Captain Schmeisser and crew is felt.

* * *

Capt. J. P. Mesquita, of the Boston schooner FRANCIS J. O'HARA, sunk by a submarine, has purchased a captain's interest in the schooner MURIEL which he is fitting out for the haddock fishery.

* * *

The steamer MOWHAWK of the Maine Coast Co. has returned to service after repairs requiring several months' time.

* * *

Capt. O. P. Linnekin of the steamer CITY OF GLOUCESTER has resigned to enter business at Gloucester, Mass. Capt. H. C. Larson has been placed in command.

* * *

The 2-mast schooner HERMAN F. KIMBALL, Capt. I. L. Hutchinson, from Windsor, N. S., for Boston, with lumber, has been wrecked on Cape Elizabeth, Me.

* * *

Capt. Frank Watts of the Boston schooner COMMONWEALTH towed the bombed British schooner BIANCA into Halifax, N. S. and has libelled the craft for $125,000.

* * *

Increased commerce between New Orleans and Porto Rico is indicated in the request of the New Orleans and Porto Rico Steamship Co. for 300 additional feet of space in the steel warehouses on the Mississippi river at Governor Nicholls street, New Orleans. The request was made of the board of port commissioners and could not be granted, inasmuch as every foot of the dock board's wharves is occupied and more space badly needed.

* * *

The American auxiliary schooner S. I. ALLARD, was driven ashore and lost on the Cuban coast late in September. Captain Mitchell and his crew of six men reached Havana in safety, Sept. 26.

* * *

Marine engineers on the Mississippi river have asked a 25 per cent increase in pay. They are now earning approximately $157 a month, and the increase will enable them to earn $180. Owners of river steamers offered the engineers a 10 per cent increase but they refused this offer and took up the matter with an arbitration board consisting of Mayor Martin Behrman, James Byrnes and W. H. Hendren, all of New Orleans.

* * *

An Emergency Fleet corporation school for the training of shipbuilders, especially with a view to educating men to take positions of responsibility and direction in shipyards, was opened in New Orleans Oct. 3. The course occupies six weeks, and the students are paid $5 a day while learning. The courses comprise blue-print reading, elementary ship construction, shipfitting, erecting and pipe-fitting.

* * *

Capt. J. F. Probaska, Morgan City, La., has purchased the Ohio river packet, HELEN LANE, and has brought her to Louisiana for use in the New Orleans sugar and rice trade. Price of the packet is not stated.

* * *

The MARIE, 3-mast schooner, the first of several to be built on speculation by the Bullock-Caldwell Shipbuilding Co., Pensacola, Fla., was sold almost as soon as she completed outfitting, to G. M. Bryde, for $100,000.

* * *

The new United States life saving station being built at a cost of $60,000 on Grande Isle, La., is virtually complete. A crew of 12 men and two officers will be stationed there permanently. A large government wireless station is also being erected at Grande Isle.

* * *

The Wolvin line, with headquarters in New Orleans, has been alloted two new

shipping board vessels, now under construction at Houston, Tex., according to the New Orleans manager of the line. The firm will continue to operate the steamer HAROLD in New Orleans-Mexican trade, with bi-monthly departures.

* * *

Need of houses for shipyard employes is acute in every shipbuilding center on the Gulf coast. Labor for government work is plentiful and lumber for the houses is abundant, but time for construction of the cottages, or even for the simplest forms of hotels and apartment houses has been lacking.

* * *

The port and harbors facilities commission of the shipping board is making a survey of the ports of the Gulf of Mexico coast of the United States with a view to increasing respective capacities and reducing the congestion of freight which is now slowly spreading from the East to the South.

* * *

The government's establishment of a lumber assembling yard and distribution point at Beaumont, Tex., has worked so well that more than 25,000,000 feet of yellow pine, either already cut into ship timbers or suitable for that purpose, are assembled in Beaumont and in yards and booms of Jefferson county, immediately surrounding that port. C. L. Chipman, special representative of the shipping board, announced recently that the government has orders for 18,000,000 feet of yellow pine. In the Long-Bell booms, near Beaumont, 10,000,000 feet has been assembled for the British government, and this is being shipped as fast as bottoms can be obtained to carry it overseas. The government has approximately 12,000,000 feet at the Long-Bell docks at Port Arthur, Tex., which is being shipped to Atlantic yards by water, saving a long rail haul. Receipts of these ship timbers at the Beaumont assembling yards range from 16 to 20 cars daily.

* * *

The WAR MARVEL, second of the big Daugherty-type steamers built by the National Shipbuilding Co., Orange, Tex., and described in the September issue of THE MARINE REVIEW, has been placed in command of Captain Dunning, and is now on her way to join other vessels of the Cunard fleet, for which she was designed and built. WAR MYSTERY, first of these ships, sailed from Orange, some weeks ago. Both were built and outfitted from deck to keel in the yards of the National company. BONHAM, the third vessel of this type, is being outfitted and soon will be ready for the sea.

Up and Down the Pacific Coast

STORAGE facilities at Seattle are at present so congested that thousands of cases of salmon have been stored at Everett and Tacoma, Wash., a practice entirely new to Puget sound. An embargo was recently placed upon further shipments of wheat to Seattle, because the shipping board has been unable to furnish sufficient tonnage to move it. Likewise, the flour mills are clamoring for ships to move the stocks of foodstuffs, which have been placed at the disposal of the government.

* * *

Splendid success is being attained by the shipping board's merchant marine training station at Seattle. The steamships CHIPPEWA and IROQUOIS, brought from the Great Lakes about 10 years ago for passenger service in these waters, are being used as training ships for the young seamen. Already the enrollment at this school has passed the 1100 mark and about 100 men are being graduated each week for assignment to the large fleet of merchant steamships being completed in the Pacific northwest. The IROQUOIS and CHIPPEWA are making deep-sea cruises during which the young men receive practical training in navigation and seamenship. This district includes the states of Washington, Oregon, Alaska, Wyoming, Montana and Idaho.

* * *

Drydocking a drydock is the feat being performed at the Puged Sound navy yard where the Heffernan dock is being overhauled and repaired in the naval basin. The Heffernan dock was recently towed from the Columbia river, a noteworthy feat in itself, and brought to Seattle where it is to be stationed. The change from the fresh water at Portland to the salt water in Puget sound necessitated some alterations which are now being made.

* * *

Representing John H. Rossetter, director general of operations for the Emergency Fleet corporation, James B. Smith, San Francisco, is making an exhaustive survey of the bunkering facilities at all north Pacific ports. These data will be used by the government in preparing plans for the future operation of the merchant marine. Incidentally, the coal operators of Washington and British Columbia have been hard pressed to meet the demand for their product during the past year. The elimination of coal imports from Australia has opened the markets in the Hawaiian islands and California to North Pacific coal men and in addition they have had unusual demand from the Oriental liners and the new ships completing in these waters.

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The entire fleet of the Canadian Pacific railroad in the Pacific has been withdrawn from commercial trade by the recent action of the British admiralty in commandeering the steamships EMPRESS OF JAPAN and MONTEAGLE. Previously the British government had taken over the EMPRESS OF ASIA and EMPRESS OF RUSSIA. This change means that in the meantime all passenger traffic to and from the Orient will be routed through Seattle and in consequence the Japanese lines operating from here have all reservations booked for months ahead. The elimination of the Suez canal route for passenger travel, has diverted a large business through Pacific ports.

* * *

Damage estimated at $500,000 sustained by the Japanese liner CANADA MARU in grounding near Cape Flattery is being rapidly repaired at the yards at Yarrows, Ltd., Esquimalt, B. C. The entire forward part of the hull was so badly injured that 135 plates will have to be removed. From stem to amidships the plates are ripped and damaged. This is one of the largest repair jobs ever undertaken on the North Pacific.

* * *

According to government edict, fresh fish has precedence over all other cargo moving from southeastern Alaska. Recently a steamship bound for Seattle with a full cargo of canned salmon was compelled to discharge 4000 cases at Ketchikan in order to make room for a shipment of fresh halibut. Reports from the Alaska banks state that the season has been exceptionally profitable. During a 10-day cruise, a small halibut fisherman took a catch which sold for $2000.

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The wooden steamship BLACKFORD, reported lost in a hurricane off the coast of Mexico, was a product of the Grays Harbor Motorship Co., Aberdeen, Wash. This vessel was built for the government, launched May 13 last and delivered Aug. 17. The BLACKFORD was lost Sept. 17.

* * *

Detailed figures covering the operation of the port of Seattle public terminal facilities show gross earnings for August of $267,921 and of $1,542,408 for the eight months ending Aug. 31 last. The port properties have been exceptionally busy and have been found inadequate to accommodate the business offering. So profitable has been the business of the port, that the commission recently eliminated a levy of nearly $300,000 on the assumption that during the coming year, for the first time in its history, the earnings of the port will be sufficient to meet not only operating expenses but to meet the requirements of the sinking fund.

* * *

As the finale to an eventful career, the HENRIETTE is now at San Francisco being converted into a 4-mast schooner for service in the Australian trade. The HENRIETTE was built as a 3-mast French bark. About 10 years ago she was wrecked off the Columbia river. Later the hull was purchased by James Griffiths & Sons, Seattle, and converted into a twin-screw steamship. As such she operated in the ore trade between British Columbia and Seattle. Lately she was sold, and so urgent is the demand for sailing ships that she is again to be operated under sail.

* * *

Several repair jobs are being handled at the new Seattle plant of the Todd Drydocks, Inc. The company's small dock has been moved from its former site at the plant of the old Seattle Construction & Dry Dock Co. to the new location on Harbor island where a large

Equipment Used Afloat and Ashore

Portable Arc Welder—Electrically Welded Chain—Portable Compressor—Improved Propeller—Marine Auxiliaries

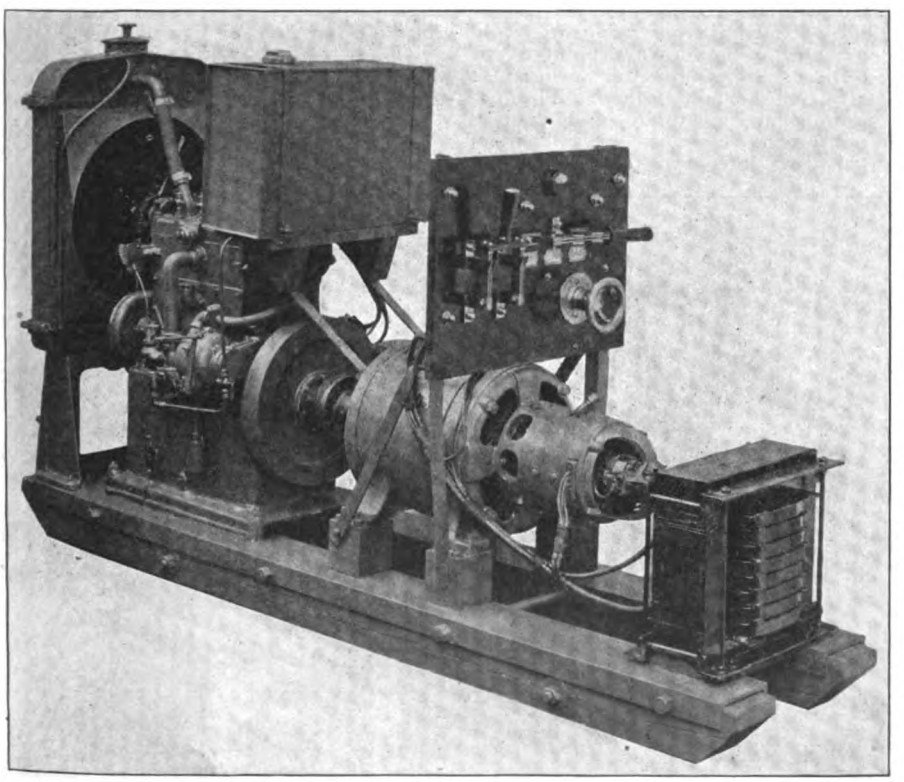
UNTIL quite recently, electric arc welding has been confined to manufacturing plants and repair shops in the iron and steel industry, where the work could be brought to the welding outfit. With the enormous expansion of the shipbuilding industry, however, came a demand for a portable outfit that could be used in places where electric current was not available.

To meet this demand, the Lincoln Electric Co., Cleveland, recently developed the outfit shown in the accompanying illustration. The unit consists of a 150-ampere arc welding generator, which is direct connected to an internal combustion engine, radiator, gasoline tank, rheostat and a control board. The outfit is mounted on skids for easy transportation from place to place.

An interesting point in the construction of this outfit is the method adopted to insure a steady arc and constant and readily controlled heat. It is generally conceded that these are two of the greatest difficulties met with in the design of this kind of apparatus.

The Lincoln company uses a compound-wound generator, the series windings of which are connected so as to oppose the shunt field and the two windings are so proportioned that the voltage decreases in the same ratio as the current increases. This limits the short circuit current. Another important effect of this is that the horsepower and, therefore the heat developed for a given setting of the regulator switch, which is shown on the control board above the generator, remains practically constant.

Additional stability is also insured by the stabilizer seen at the extreme right of the illustration. This is a highly inductive low resistance coil connected in the welding circuit. It serves to connect momentary fluctuations of current in much the same manner as the flywheel of an engine produces an even rotary speed.



PORTABLE ELECTRIC ARC WELDING OUTFIT MOUNTED ON SKIDS.

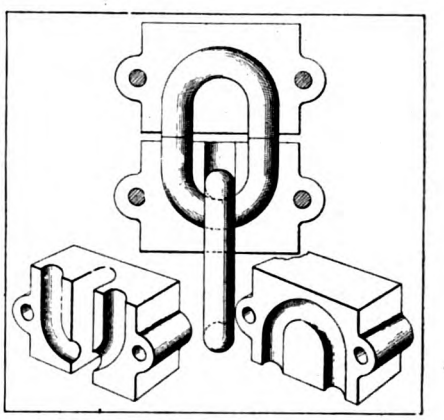
Chain Welded by New Process

To provide means for economically welding comparatively small chain, such as used aboard ship, a New York inventor, Thomas E. Murray, recently obtained a patent for welding chain by electricity.

In making light chain, the process heretofore followed consists of first winding the stock in the form of a helix much after the manner in which a machinist winds a closed spring. The mandrel upon which the stock is wound is made to give the shape desired in the chain links, round, oval, etc.

The next step is to cut the material in the form of separate links. They are cut away from the coil one at a time, generally on a punch press fitted with a cutting chisel.

The open links thus obtained go to the chain forger who heats them and welds the ends together. In starting a shot of chain, one link is first welded, another built on and welded and so on until the desired length is completed. The welding is sometimes done by hand, especially in England, although in this country a light, specially designed trip-hammer is employed.



ELECTRIC CHAIN WELDING DIES

The object of Mr. Murray's invention is to provide a more efficient means for welding the links. In his process, the link is first formed in two U-shaped sections. These are placed in suitable jaws of an electric welding machine where they are fused together, the two sections forming an integral link.

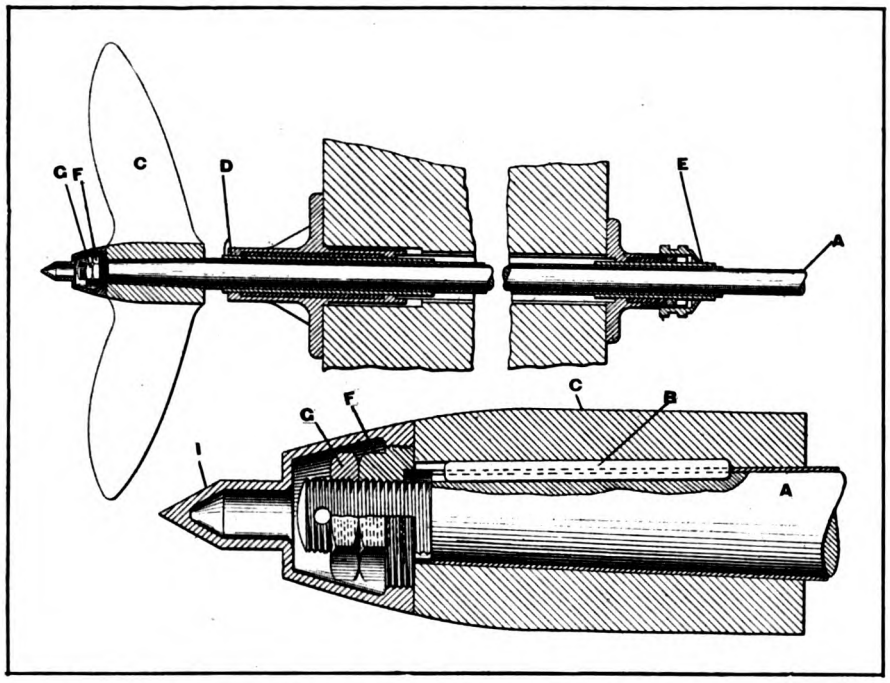
The shape of the jaws used is shown in the accompanying illustration. The lower section of one jaw, which is shown at the right, is to accommodate the end of the chain that is in process of formation. The jaw shown opposite is provided with a slot to accommodate the chain that already has been completed, since this must pass through the jaws as it is formed.

Portable Compressor

Labor saving devices are receiving close attention at the present time owing to the fact that the labor question is a serious one with every shipyard. With this object in view, the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., recently designed the portable air compressor outfit shown in the accompanying illustration.

The outfit can be readily hauled to the job, put quickly to work, and removed when needed elsewhere. It is pointed out that a saving is shown in line piping and air hose.

The compressor installation can be



PROPELLER AND SHAFT DESIGNED TO SECURE FIRM SEATING AND TO RESIST CORROSION

used in any place where electric current is available. It consists of a 10 x 12 inch compressor driven by a 50-horsepower electric motor and it has a capacity of 300 cubic feet of air per minute at a pressure of 100 pounds to the square inch.

The installation is complete and compact. The motor, rheostat and compressor are mounted directly on the bed frame while the tank is suspended below. The drive from the motor to the compressor is by a wide-faced belt which is supplied with an idler for assuring the correct belt tension. The outfit is equipped with a top to protect the machinery from the weather.

Marine Auxiliaries

An attractive 124-page catalog describing marine auxiliaries has recently been issued by the Griscom-Russell Co., New York. The book contains numerous illustrations and describes evaporators, distillers, evaporator feed heaters, feed water heaters, bath heaters, oil coolers, oil heaters, grease extractors, aerating filters and coils.

The first part of the book describes evaporators. It is pointed out that seagoing vessels must have provision for supplying water suitable for boiler-feed make up, for taking care of the losses throughout the system and for furnishing water for drinking and galley purposes. The submerged type of evaporator made by the company is fully described. In this the coils are designed to be readily removed for inspection and cleaning.

Instructions for installing an evaporator and distilling plant are given. An illustration is included in the description, with all the important parts marked for quick reference. The importance of pure drinking water aboard vessels is pointed out and a description of an evaporator for a small drinking-water set is given. The reasons for using a distiller aboard ship are explained and a general description of the company's distiller follows, together with directions for installation. Suggestions for distilled water allowance on shipboard are given. These include gallons per 24 hours per capita for drinking and galley, and for wash water.

An evaporator feed water heater bears the same relation to an evaporator as a boiler feed water heater bears to a boiler. A complete description of the company's heaters for this purpose is given together with capacities, hydrostatic test pressures, etc.

The disadvantages of using cold feed water in boilers are pointed out and descriptions of the company's feed water heaters follow. The descriptions are complete and contain many interesting facts. Full illustrated directions for the installation of feed water heaters are included in this section.

Bath heaters, oil coolers, fuel-oil heaters, and filters for both oil and water are fully described and general directions are given for their installation and use.

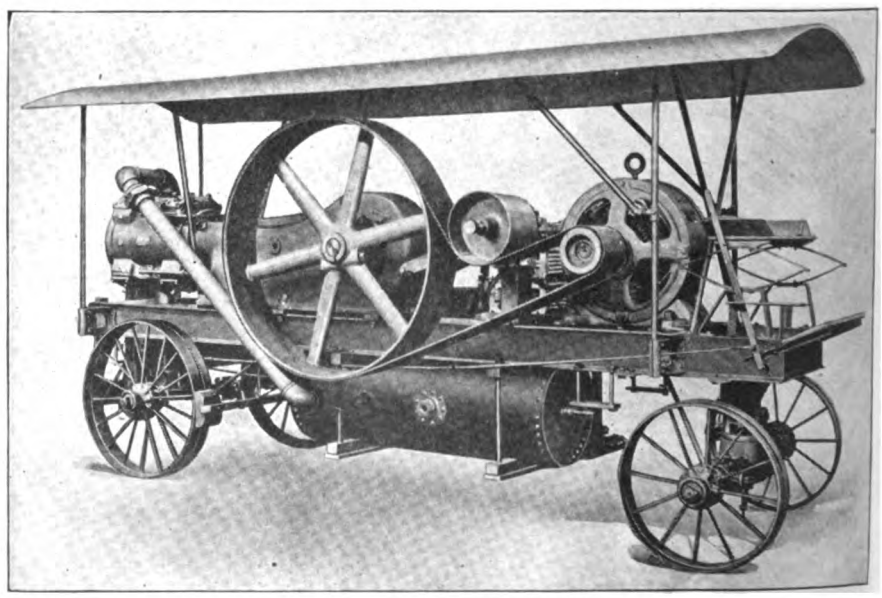
Improved Propeller

The propeller and shaft shown in the accompanying illustration was patented recently by E. A. Riotte, Jersey City, N. J. The device is novel in design and simple in construction. The shaft *A* is steel. The outer end is tapered and provided with a key *B* for holding the propeller *C* in place. The part of the shaft that passes through the bearings *D* and *E* is covered with a copper alloy jacket, the object of which is to reduce corrosion to a minimum. The bushings are also made of copper alloy for the same reason.

The propeller is forced in place by means of a set-up nut *F*. This nut is locked in place by the lock nut *G*. The outboard end of the shaft is threaded for the accommodation of these nuts. The action of the first nut forces the propeller firmly in place, and as the copper alloy sleeve is of a soft nature a firm joint is assured. The cap *I* screws against the hub of the propeller, the shoulder on the set-up nut being threaded for this purpose. The object of this cap is to exclude moisture from the nuts. To this end, the joint between the cap and the propeller is made watertight.

Increases Capacity

The Chicago Pneumatic Tool Co. has let the contract for and work has been started on the erection of an addition to its Cleveland plant, which is planned to double the present output. It is expected that work will be completed on the building itself about Nov. 1. The necessary equipment has been ordered and will be ready for installation by the time the building is completed.



COMPACT PORTABLE AIR COMPRESSOR OUTFIT FOR SHIPYARDS